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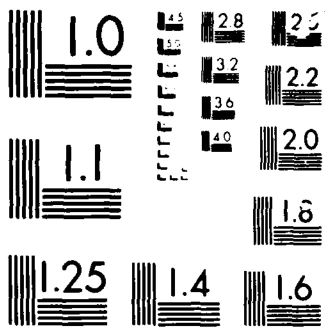

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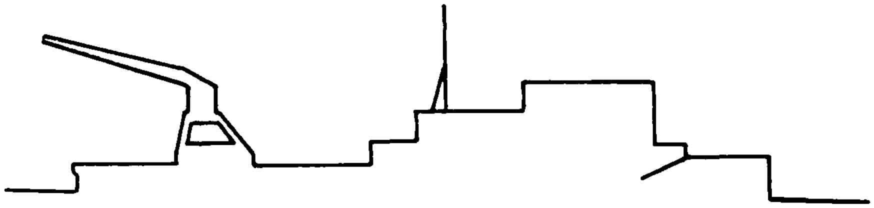

Ocean Engineering

CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON NAVY YARD
WASHINGTON, DC 20374

2

PROJECT EXECUTION PLAN

FOR THE INSTALLATION OF THE SOCAL ACOUSTIC RANGE (SOAR)

FPO-1-84 (4)

by

Keith Cooper   Ted Jones

approval
CHESNAVFACENGCOM
Code FPO-1

approval
UCT-2

OCEAN ENGINEERING
AND CONSTRUCTION PROJECT OFFICE
CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON,D.C. 20374

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The Southern California Acoustic Range (SOAR) is designed to provide a 100 square mile Anti Submarine Warfare training range in 4000 feet of sea water west of San Clemente Island, California. SAR will provide accurate tracking of air, surface and submerged targets. (Con't)

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The Chief of Naval Operations tasked NAVAIR to form a team for the planning and execution of SOAR. The Naval Underwater Systems Center (NUSC) has been assigned as the Technical Direction Agent who in turn has tasked the Chesapeake Division of Naval Facilities Engineering Command (CHESDIV), Ocean Engineering and Construction Project Office, Code FPO-1, with the installation of the underwater portion of the project.

This plan is a working document that details the mobilization, execution and demobilization of the underwater portion of the SOAR project. The overall scenario of the project is to accomplish the following: (a) Prefabrication and assemble project materials at NOSC, San Diego; (b) Conduct training near Coronado beach; (c) Mobilize the OCP SEACON and UCT-2 personnel and equipment at West Cove, San Clemente Island; (d) Land the SSL cable and deploy the SSL system at sea; (e) Land the WQC cable and deploy the WQC transducer at sea; (f) Conduct a complete as-built survey (g) Demobilize SEACON and return all equipments (h) Prepare a detail completion report.

LIST OF FIGURES AND TABLES

SECTION 1, INTRODUCTION

The Southern California Acoustic Range (SOAR) is designed to provide a 100 square mile Anti Submarine Warfare training range in 4000 feet of sea water west of San Clemente Island, California. SAR will provide accurate tracking of air, surface and submerged targets.

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e. Land the WQC cable and deploy the WQC transducer at sea.
f. Conduct a complete as-built survey
g. Demobilize SEACON and return all equipments
h. Prepare a detail completion report

The general plan and location of SOAR is shown as Figure 1.1, and 1.2.

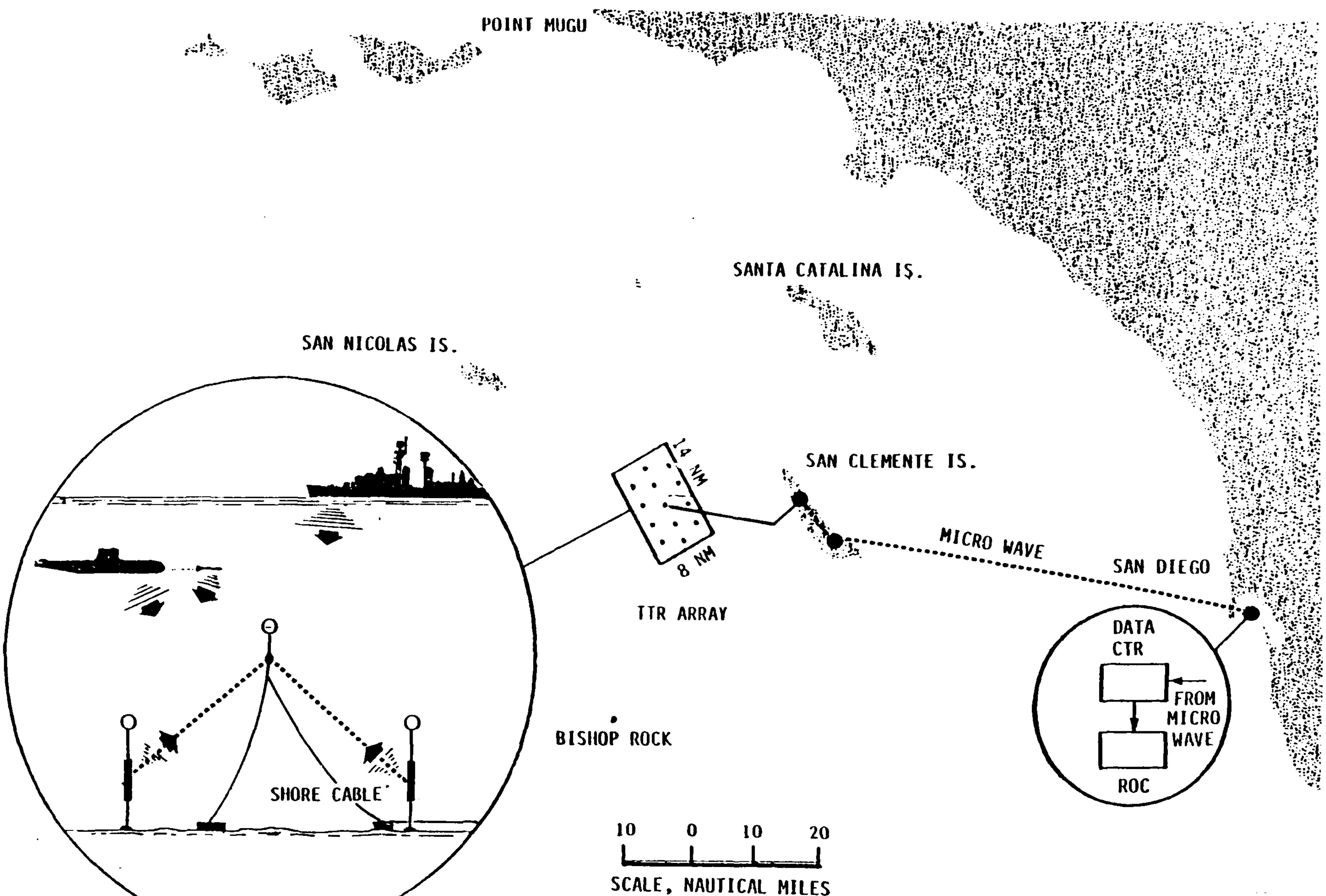
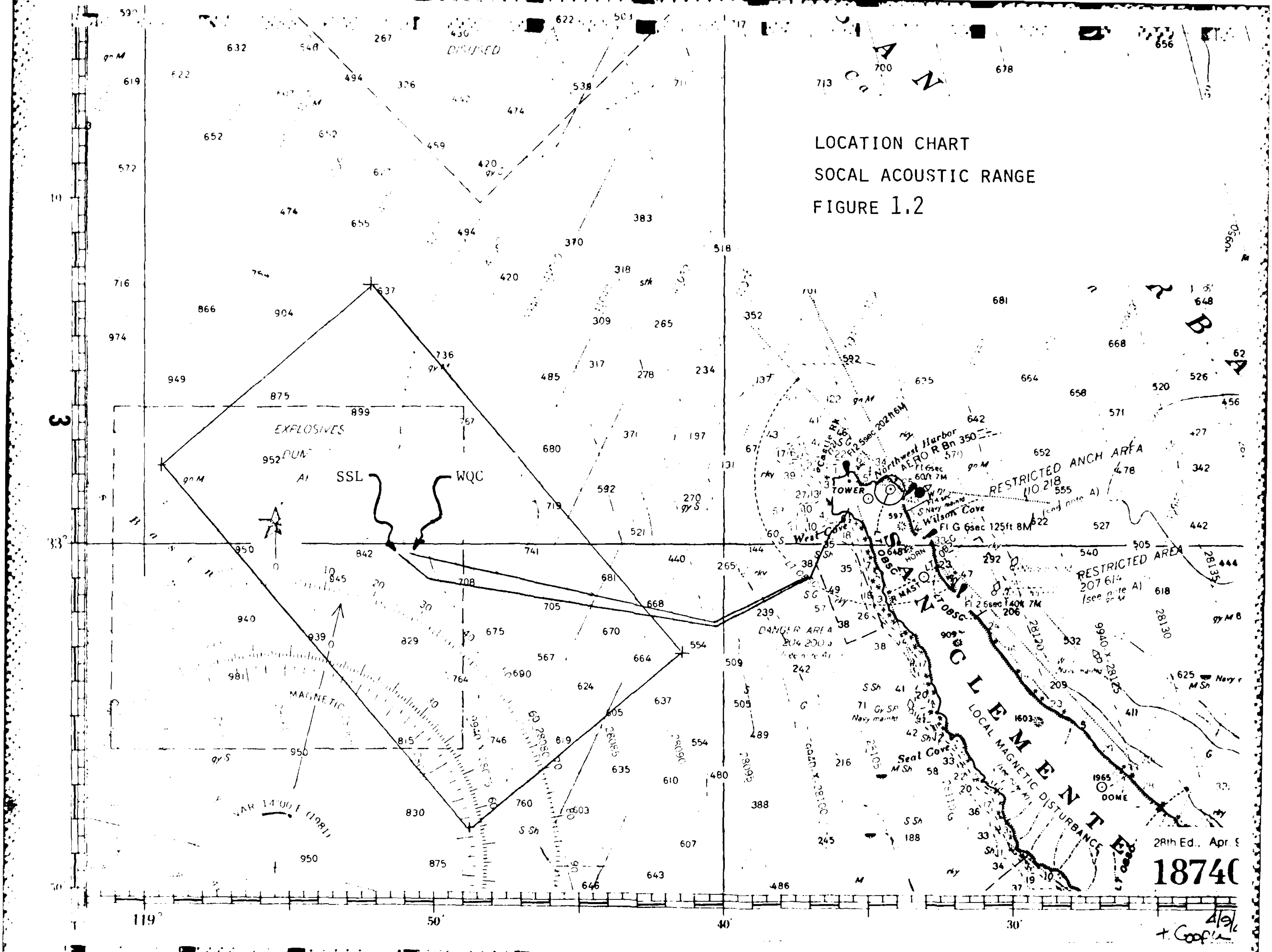


FIGURE 1.1
SOAR GENERAL PLAN AND LOCATION MAP



LOCATION CHART
SOCAL ACOUSTIC RANGE
FIGURE 1.2
SSL
WQC
EXPLOSIVES
SAN CLEMENTE
LOCAL MAGNETIC DISTURBANCE
RESTRICTED ANCH AREA
RESTRICTED AREA
DANGER AREA
Northwest Harbor
Wilson Cove
West Cove
Seal Cove
TOWER
DOME
DISUSED
MAGNETIC
VAR 14°00'E (1981)
28th Ed., Apr.
1874
119°
50'
40'
30'
33°

SECTION 2. PROGRAM MANAGEMENT

The overall program manager for the SOAR Project is the Director, Range Instrumentation Division (AIR-630) of the Naval Air Systems Command. AIR-6303 is the Head of the Sea Range Projects Branch. Within this branch, the Underwater Systems Engineer (AIR-6303F) is responsible for the management and execution of the Project. NUSC has been assigned as the Technical Direction Agent (TDA) for the project. Refer to figure 2.1.

NUSC, as TDA, will manage procurement of installable components and provide technical direction of the installation sites. The in water portion of SOAR will be managed by CHESNAVFACENGCOM, Code FPO-1. Code FPO-1 will be supported by Underwater Construction Team Two, NOSC, San Diego, and PWC, San Diego as shown in figure 2.2.

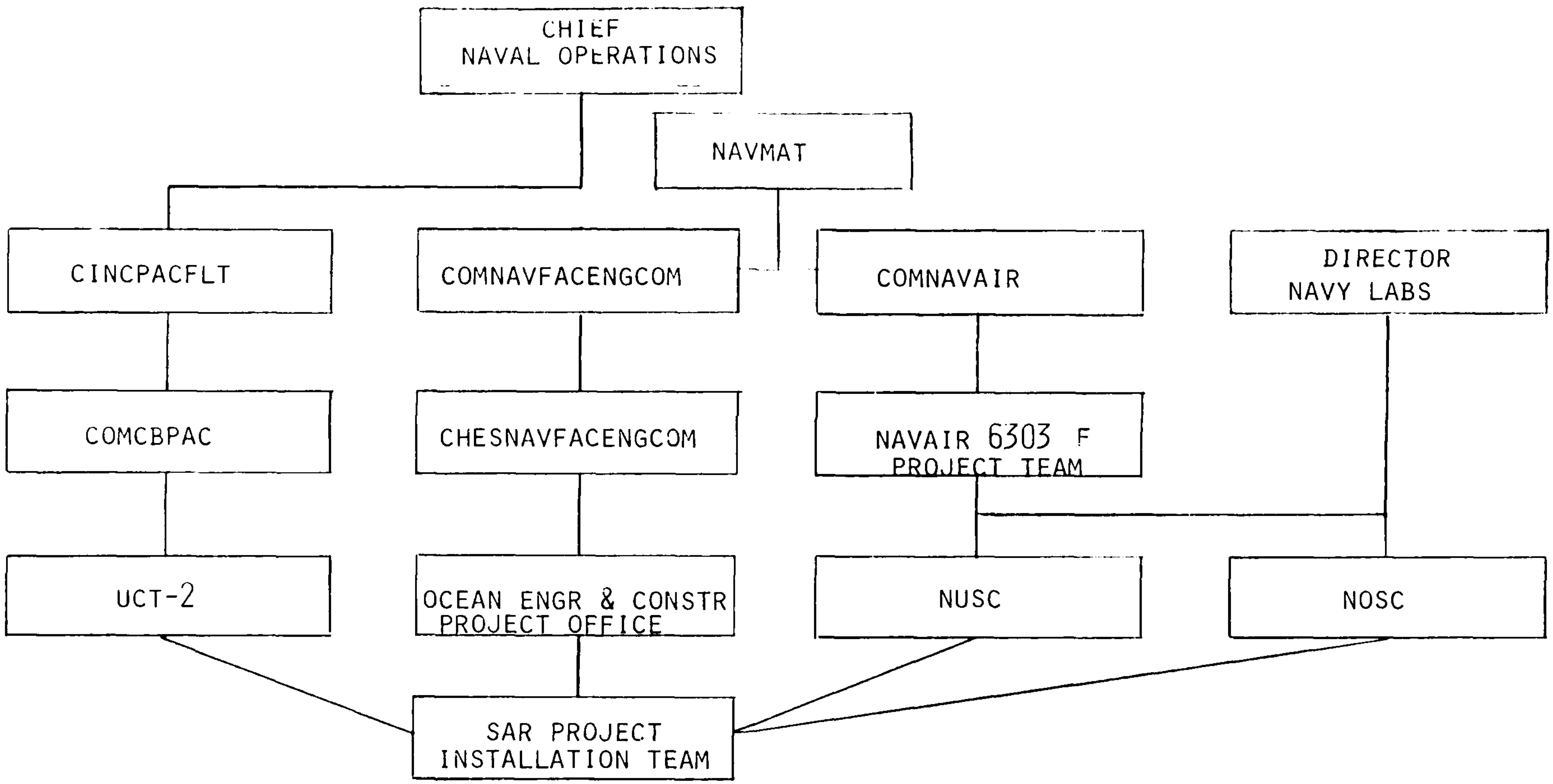


FIGURE 2.1
SOAR PROJECT ORGANIZATION

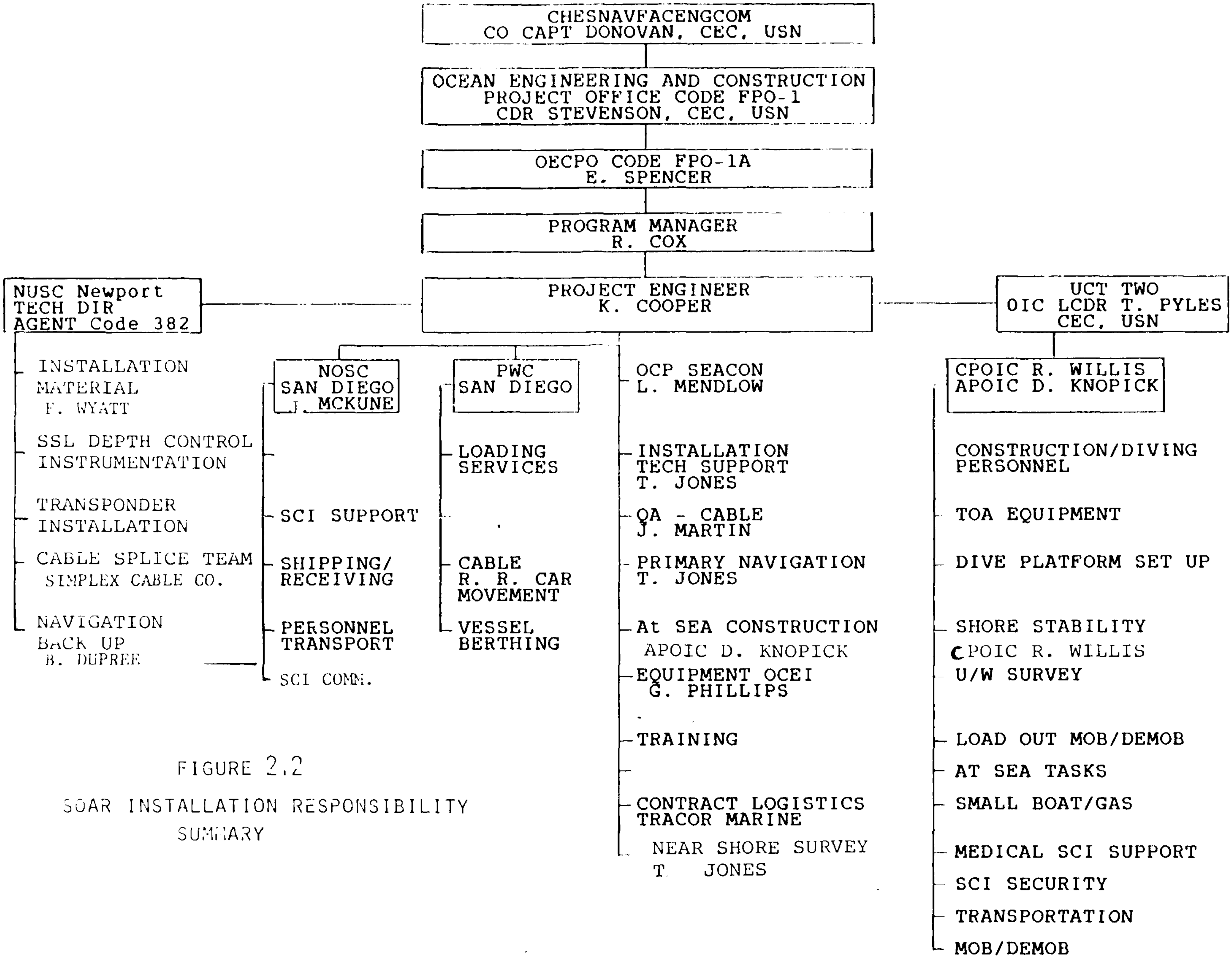


FIGURE 2.2

SOAR INSTALLATION RESPONSIBILITY SUMMARY

SECTION 3, PROJECT SCHEDULE

General project schedule - major tasks

JULY	
20	SEACON arrival at San Diego. Berth at PWC pier.
AUGUST	
6-20	Mobilization by UCT-2, transport of equipment to Naval Air Station, North Island. Mobilization of LCU dive platform at UCT-2 Port Hueneme.
20	LCU transit to SCI with UCT-2 equipment.
21	Personnel transit to SCI., Start beach survey on SCI.
27	Underwater survey, start trenching operations
31	WQC cable and SSL cable at pier in San Diego, begin cable loading and splices.
SEPTEMBER	
3	Assembly of SSL and WQC components
4	SEACON crew aboard for ship system mobilization. NUSC aboard for navigation system mobilization
6	Cable tests.
8-9	Operations Training neat Pt. Loma, CA
10	Set up navigation status on SCI PM transit to SCI - stand off SCI, West Cove
11	Land SSL cable, begin underwater cable laying and burying operations.
12	Deploy SSL
13	Land WQC cable
14	Deploy WQC cable
15	SEACON off load material and personnel SCI, return to San Diego
16	SEACON demobilization
16-24	Continue underwater cable burying operations
24-25	Final inspection by UCT-2
25-28	Inventory, demobilize operations Return equipment to OCEI

SSL INSTALLATION SCHEDULE - DETAILED

Date	Time	Hours	
		-	SEACON STANDING BY OFFSHORE OF WEST COVE
		- 1.0	SEACON 1700 ft OFF BEACH - CABLE READY
9-11	0600	0.0	DEPLOY CABLE END TO BEACH
		+ 1.5	PULL 2200 ft ASHORE
9-12	0630	23.0	LAY CABLE @ .75 KNOTS ARRIVE TO 1st CLUMP AND HOLD
		25.0	ATTACH & OVERBOARD CLUMP
		26.0	LOWER CLUMP
		27.0	ATTACH SSL & OVERBOARD
		28.0	PAYOUT BACKSTAY & CONNECT CLUMP
		29.0	LOWER CLUMP
		31.0	POSITION 2nd CLUMP
		32.0	PAYOUT GRAPPNEL LEG & CONNECT CLUMP
9-12	1630	33.0	LOWER 3rd CLUMP TO BOTTOM

WQC INSTALLATION SCHEDULE - DETAILED

DATE	TIME	Hours	
		-	SEACON Standing by offshore
		- 1-0	SEACON 1700 ft off beach - cable ready
9-13	0600	0-0	Deploy cable end to beach
		1.5	Pull 2200 ft cable ashore
	0530	23.5	Lay cable @ .75 Knots, arrive at WQC site
9-14	0600	24.0	Deploy WQC
	0900	27.0	Release SEACON

SECTION 4. MOBILIZATION

GENERAL

The mobilization phase is organized to pre-stage all project equipment and some materials at UCT-2 in Port Hueneme, Ca. UCT-2 trucks will transport materials to NAS North Island for commercial barge transportation to San Clemente Island.

Major project materials will be staged at NOSC San Diego. SEACON will mobilize and load cables at PWC San Diego.

CHESDIV

CHESDIV will provide overall coordination for the project during the mobilization phase. The OCP SEACON will be mobilized from a berth in San Diego and then move to a position near a rail siding at PWC. The SEACON deck layout will be as shown in Figure 4.1.

CHESDIV will direct, and maintain quality control over cable handling operations. UCT-2 personnel will load project cable into the cable bin and on to cable reels. The training cable will be loaded and stored on a 96" diameter reel. The clump lowering line will be placed on a 126" diameter reel and loaded on to the powered reel stand. The 126" diameter reel will also contain the SSL backstay leg over the grapnel leg. All cables or lines will be secured to the cable reel.

Cables will be loaded aboard SEACON from rail cars. PWC will provide a hydraulic crane. A 42 inch diameter sheave will be lifted by the crane to a position approximately 45 feet above the rail car. The sheave will be secured by tag lines. A similar sheave will be used on SEACON'S gantry crane. Cable will be routed through both sheaves to the powered jockey wheel above the cable bin.

The WQC cable will be loaded into the on deck cable bin. The sea end of the cable will be next to the exterior of the bin. After wood dunage is placed over the WQC cable, the SSL cable will be loaded. The SSL/EM cable will exit the cable bin at a point 25 ft from the EM cable to back stay leg junction plate. The plate and EM cable towards the SSL electronics will be exterior to the cable bin.

Major components provided by the Ocean Construction Equipment Inventory (OCEI) are listed in Appendix A.

UCT-2

UCT-2 will be responsible for providing all equipments and man power required to complete their assigned tasks. Project materials listed in Appendix A will be procured by UCT-2 and delivered to the project site.

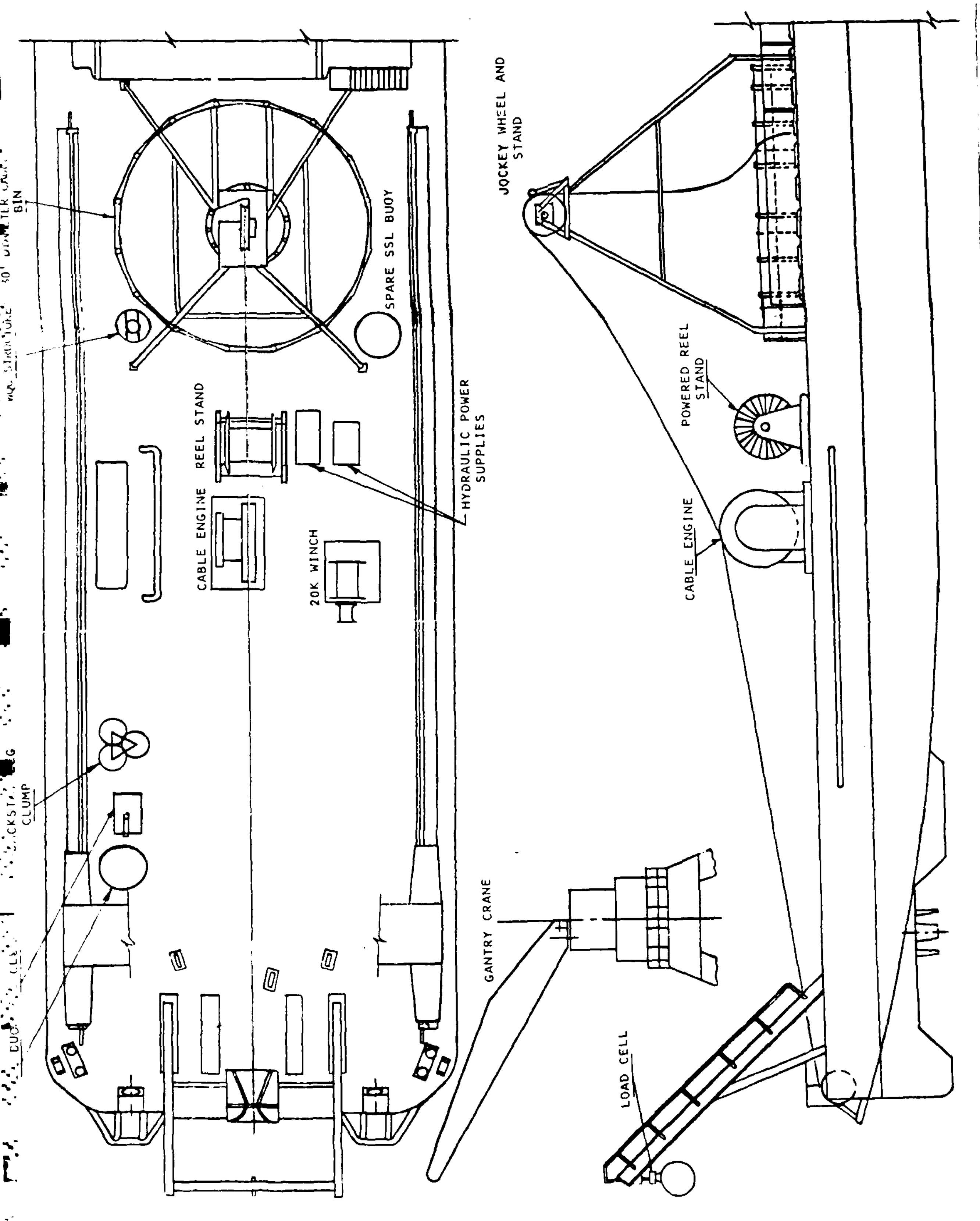
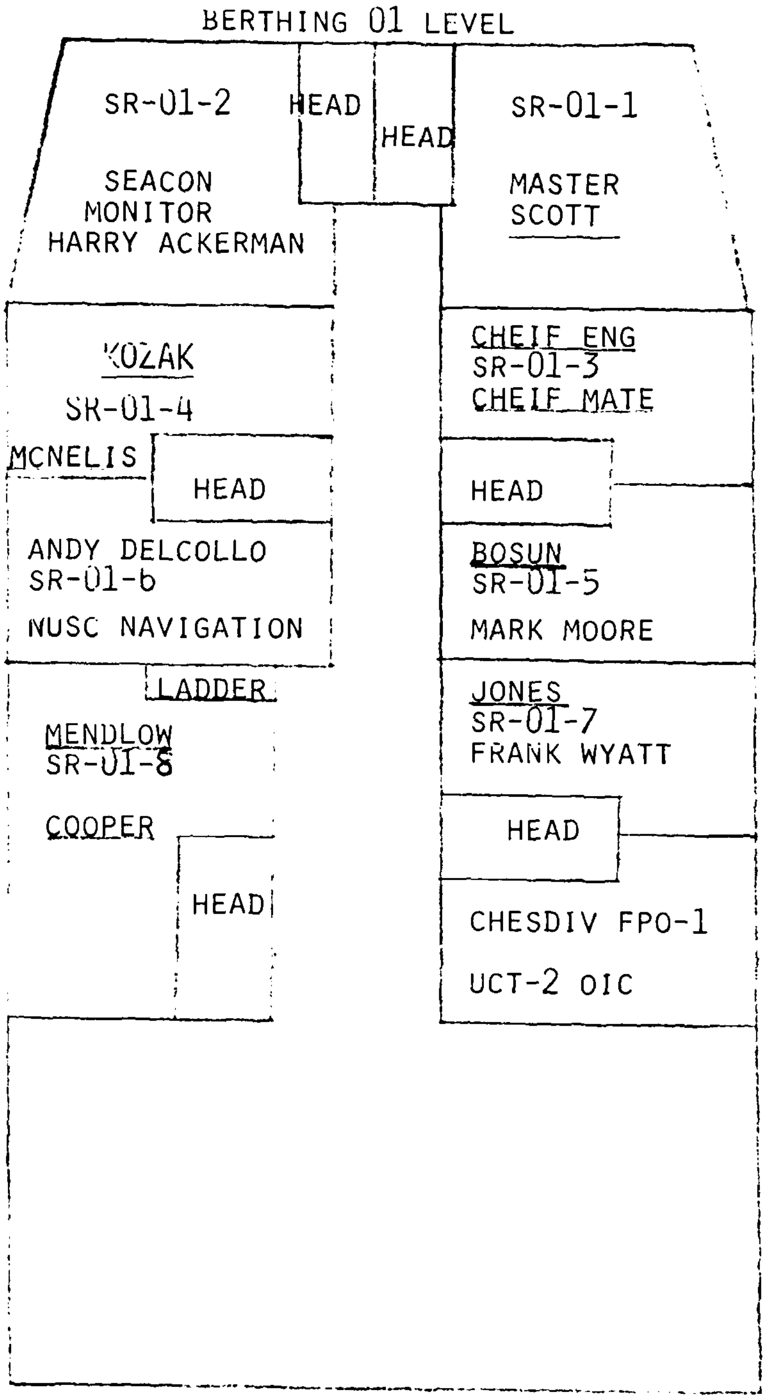
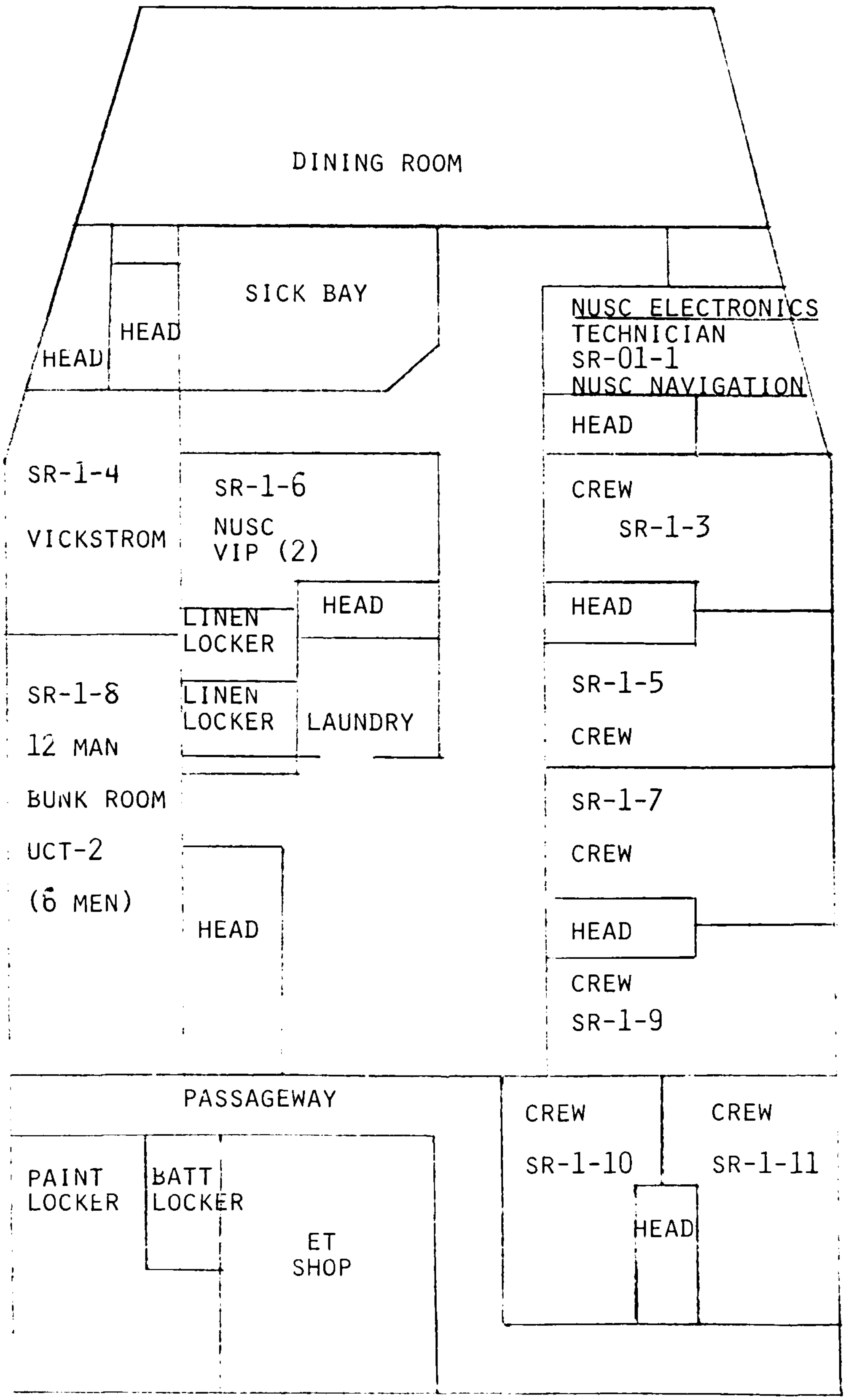


FIGURE 4.1
SEACON DECK LAYOUT



BERTHING ASSIGNMENTS
FIGURE 4.2A

BERTHING MAIN DECK



BERTHING ASSIGNMENTS
FIGURE 4.2B

UCT-2 will be responsible for mobilizing the diving platform (LCU) and the LARC-5. The diving platform will require the installation of the Modular Mooring System, 360 CFM compressor, air lift system, generator, diving systems for surface supplied diving, and other equipments for operations on the project site.

UCT-2 will be responsible for providing two steel worker rates to weld components to SEACON decks.

UCT-2 will be responsible for the arrangements required to schedule the movement of materials to San Clement Island. UCT-2 will provide weight and cube information to NOSC as necessary in order to meet scheduled barge trips to SCI and provide transportation from the dock at SCI to the project site.

NUSC, Newport

NUSC will provide the SSL and WQC materials for installation at the project site. NUSC will advise NOSC of the operations necessary to mobilize this material. CHESDIV will be advised of the deliverable materials and the schedules of materials required.

NUSC will provide a Del Norte navigation system to be used as a backup to the primary SEACON system. NUSC will provide two personnel to support navigation operations.

NUSC will provide personnel and electronics to determine the installed depth of the SSL.

NOSC, San Diego

NOSC will be the major staging area for project materials. The buoy and a majority of the installables will be staged at NOSC. The clump weights will be delivered to NOSC.

Materials will be moved by NOSC truck to the PWC dock where SEACON is berthed. The SEACON crane will be used to load materials aboard and spot materials in the proper position on deck.

Mr. Bill McKune, NOSC, will be the contact for all air transportation to and from SCI, and act as project liaison for all support on SCI.

PWC, San Diego

CHESDIV will arrange for the docking of SEACON at the PWC dock. PWC will arrange for the movement of rail cars containing project cables to be moved into position next to SEACON. PWC will then provide a crane and operator to hold a cable sheave over the rail car during cable loading operations. PWC will provide additional material handling support as required.

TRACOR MARINE, Ft. Lauderdale, FL

Tracor will provide ships crew and services for SEACON under an existing CHESDIV contract.

During the mobilization phase, TRACOR will provide a cable bin, stern cable chute, cable engine, jockey wheel and stand and other ship/project logistics support.

SECTION 5, NEAR SHORE SURVEY

The near shore survey of West Cove will provide an accurate center line location of cable routes and establish range markers for use as visual reference from seaward.

Existing survey bench marks "Lamar 1" and "Capitaine 3" will be used to establish "Pad 1" which overlooks West Cove. Pad 1 will be used as the primary position for the survey. CHESDIV will provide two electronic distance measurement (EDM) systems and a project engineer for the survey. UCT-2 will be responsible for providing one EA kit for use as a back up system, two hand held radios and one EA rate to assist the project engineer. Separate survey log books will be maintained by the project engineer and the assigned EA rate.

The survey will begin from the bench mark "Lamar 1". Refer to Fig 5.1 and 5.2. The project engineer will set up a WILDE T2 theodolite and K&E electronic distance measurement (EDM) system at Lamar 1. An EDM reflector target and stand will be placed at Capitaine 3 as a reference station.

Using the WILDE T2 theodolite set the scope on the reflector target to Capitaine 3 and set the base ring to 80°49'18.48". This bearing will align the instrument to True North. Set the EDM per manufacturers instructions included with the instrument. Using the EDM, confirm the distance between Lamar 1 and Capitaine 3 is 4328.06 ft.

The position of Pad 1 can be established at a bearing of 96°32'14.02" at a range of 628.73'. A second reflector and range pole will be required for this position. Pad 1 is an unused concrete foundation. The exact position will be marked by a chiseiled cross mark in the concrete, orange spray paint around the cross and PAD 1 marked near the position. After all bearings and distances are rechecked and logged move the EDM system to Pad 1.

Set the WILDE T2 and EDM over Pad 1. Position a reflective target at Lamar 1. With the WILDE T2 facing towards Lamar 1, set the base ring on 276°32'14.02". Confirm the distance between positions as 628.73 ft. As a second check of position, confirm that Capitaine bears 78°12'9.69" at a range of 3726.73'.

The back range marker will be positioned using a reflector target and range pole. Set the WILDE T2 to a bearing at 73°51'22.07". Move the reflective target along the bearing to a point ranging 1912.96'. Drive a survey stake at this position. Mark the stake "BRMK". Set the forward range markers in a similar manner at bearing 80°16'18.99", range 1771.30', and mark of "FRMK".

Range markers, shown in Fig 5.3 will be assembled and installed by UCT-2.

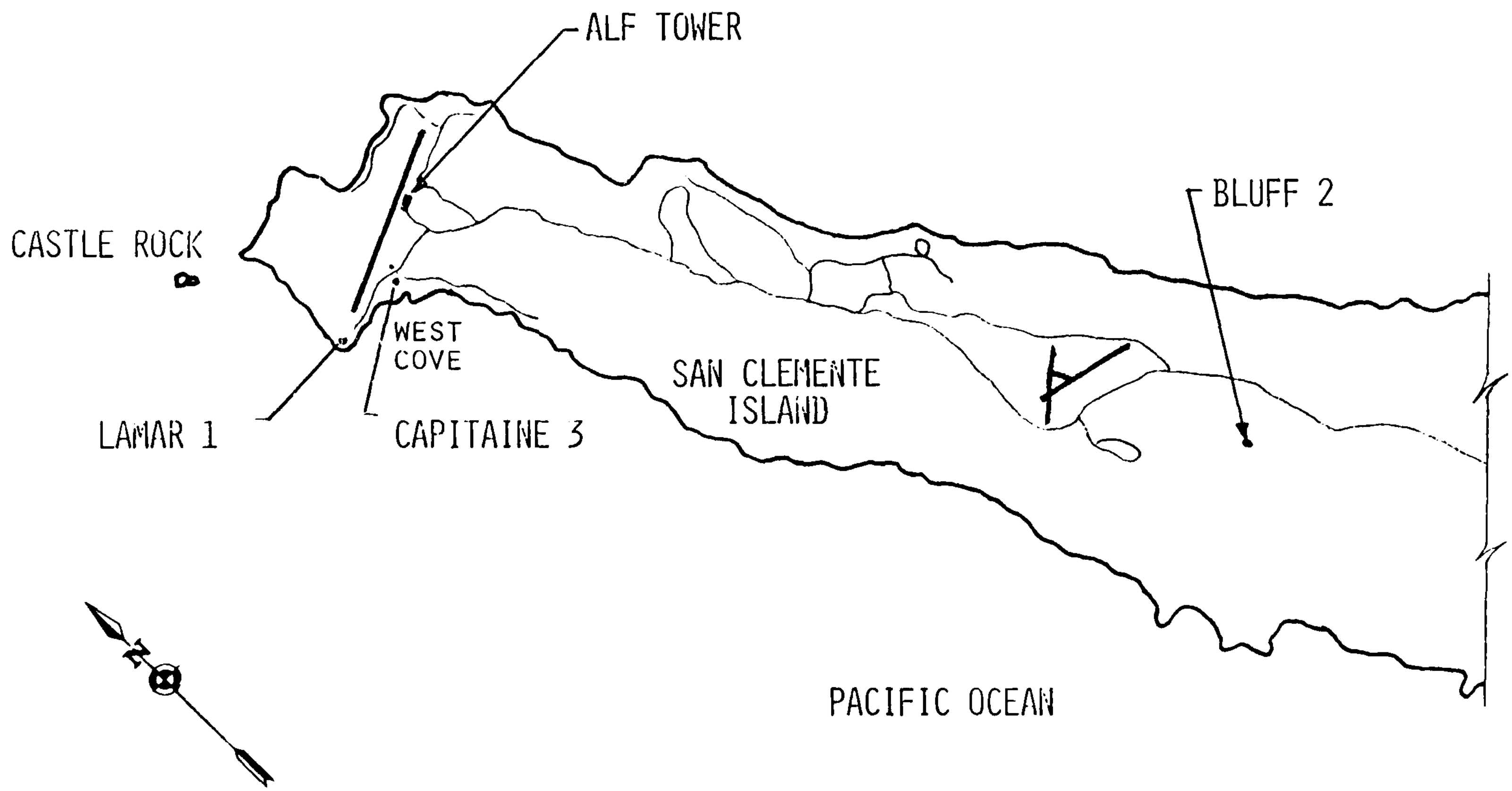


FIGURE 5.1

SOAR SURVEY STATIONS

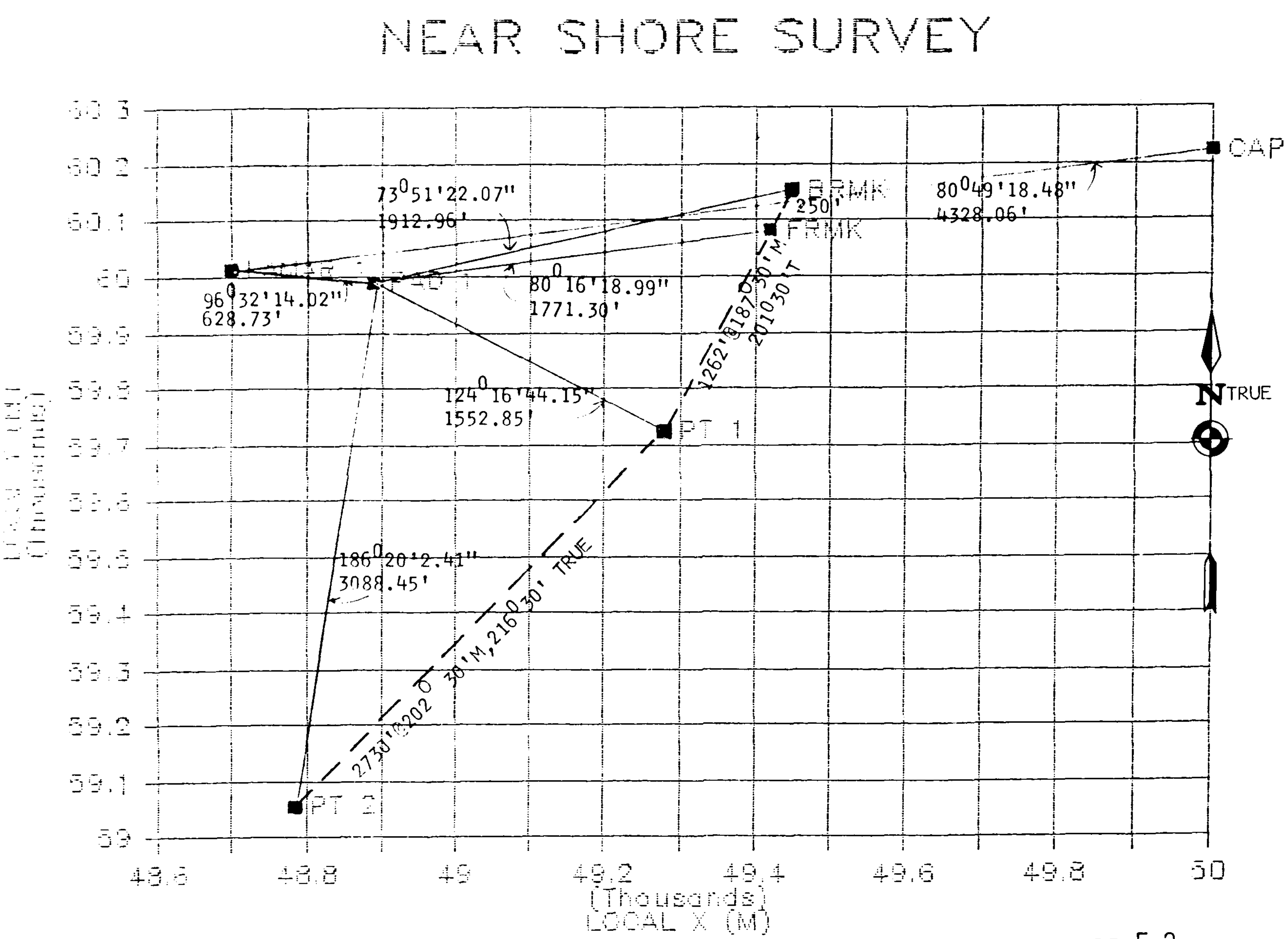


FIGURE 5.2

SOAR SURVEY DATA

BUOY LOCATIONS

The purpose of the underwater survey is to accurately define cable routes which are adjusted around unusual bottom contours. The range markers and buoys establish a center line for the cable installation. The SSL cable will be installed 15' south of the line and the WQC cable will be installed 15' to the north.

In order to accurately position cable routes, two spar buoys are required at cable turning points as shown in Fig 5.2. Each spar buoy will be assembled by UCT-2 as shown in Fig 5.5.

The spar buoys will be positioned using a K&E Pulse Ranger EDM mounted on the WILDE T2. The Pulse Ranger instrument has the capability of ranging on any highly reflective surface.

The spar buoys will be placed from a small boat provided by UCT-2. Using Pad 1 as a bench mark position, set the bearing at 124°16'44.15". Maintain this bearing and guide the small boat out from shore using a radio. At a range of 1552.85 ft. the small boat will drop the buoy weight. A surface diver will be required to adjust the buoy line to a point where the water level is approximately mid length on the buoy. The small boat will then be positioned next the the buoy and the correct range and bearing confirmed. Divers will drive rebar stakes around the clump weight (chain) in order to assist position keeping of the buoy and clump weight.

The second spar buoy will be positioned in a similar manner on a bearing of 186°20'2.41" at a range of 3088.45 ft.

In case of poor weather conditions, each buoy will be set using two cross bearings. The WILDE T2 instrument will be set at Pad 1 and a second instrument, provided by UCT-2, will be set as shown in Fig 5.4.

UNDERWATER SURVEY

UCT-2 will be responsible for the underwater survey. The survey will be accomplished by placing a weighted 1/4" diameter yellow polypro line along each cable route. Divers will swim the line and install 3/8" diameter rebar rods, approximately 36" long, every 100' to mark a good cable path. In the event that a rock outcrop or other cable hazard is located, the line will be moved and staked in a new location. Deviations in the cable route will be surveyed and logged for as-built data.

Each diver will provide the CHESDIV Engineer with an accurate assessment of the bottom conditions which will be maintained in the survey log.

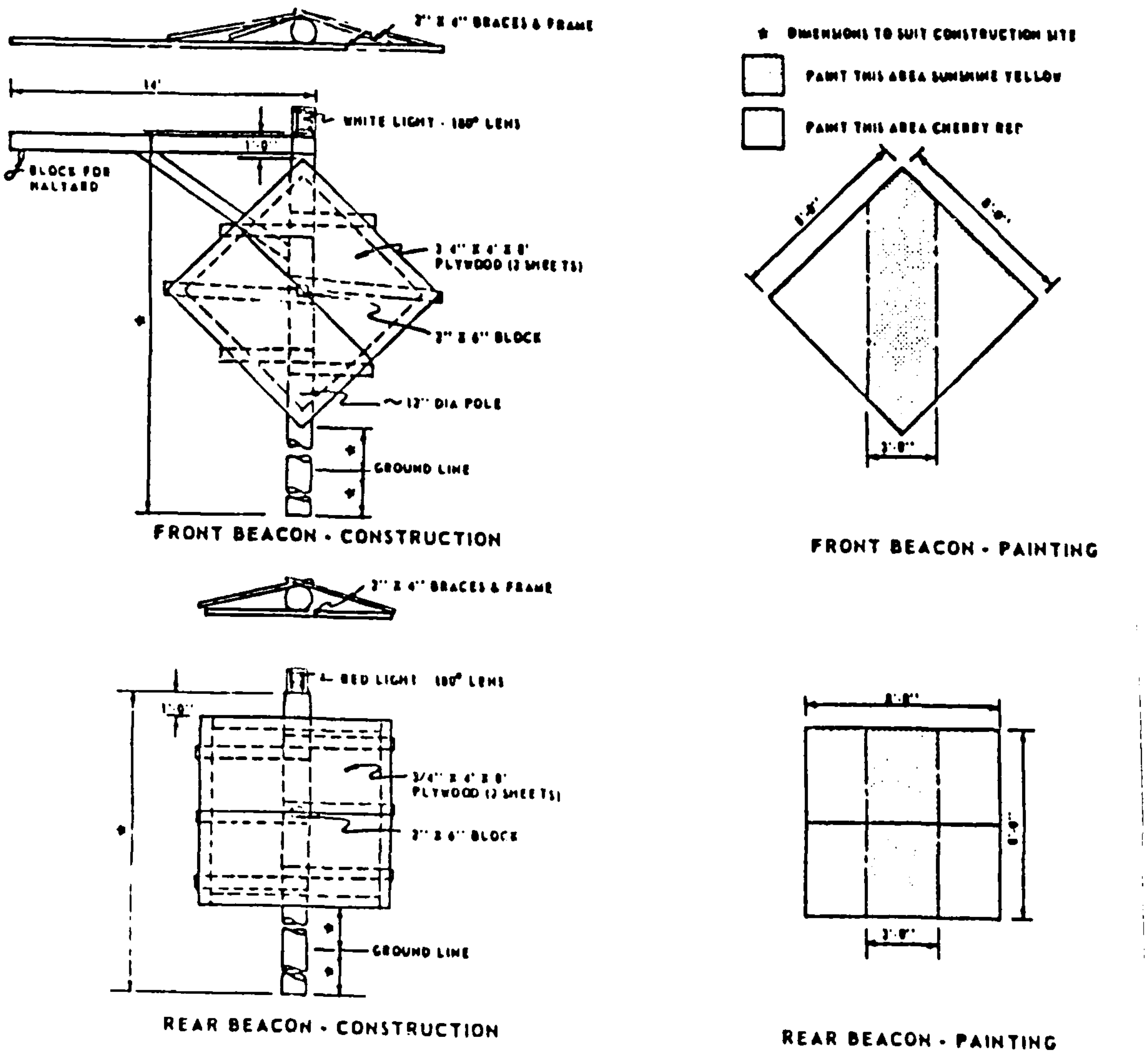


FIGURE 5.3

RANGE MARKERS, CONSTRUCTION DETAILS

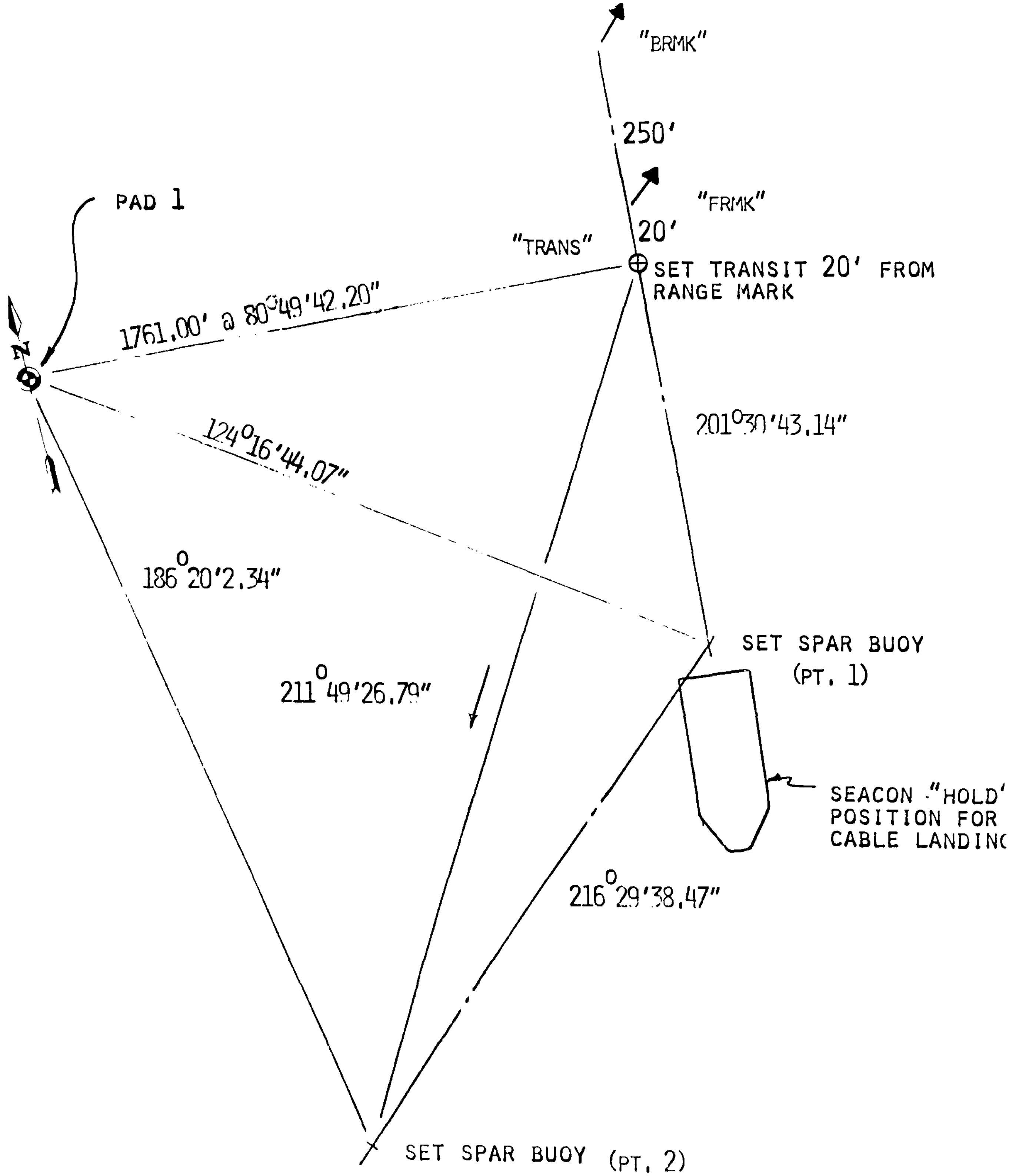


FIGURE 5.4

TRANSIT CROSS BEARINGS

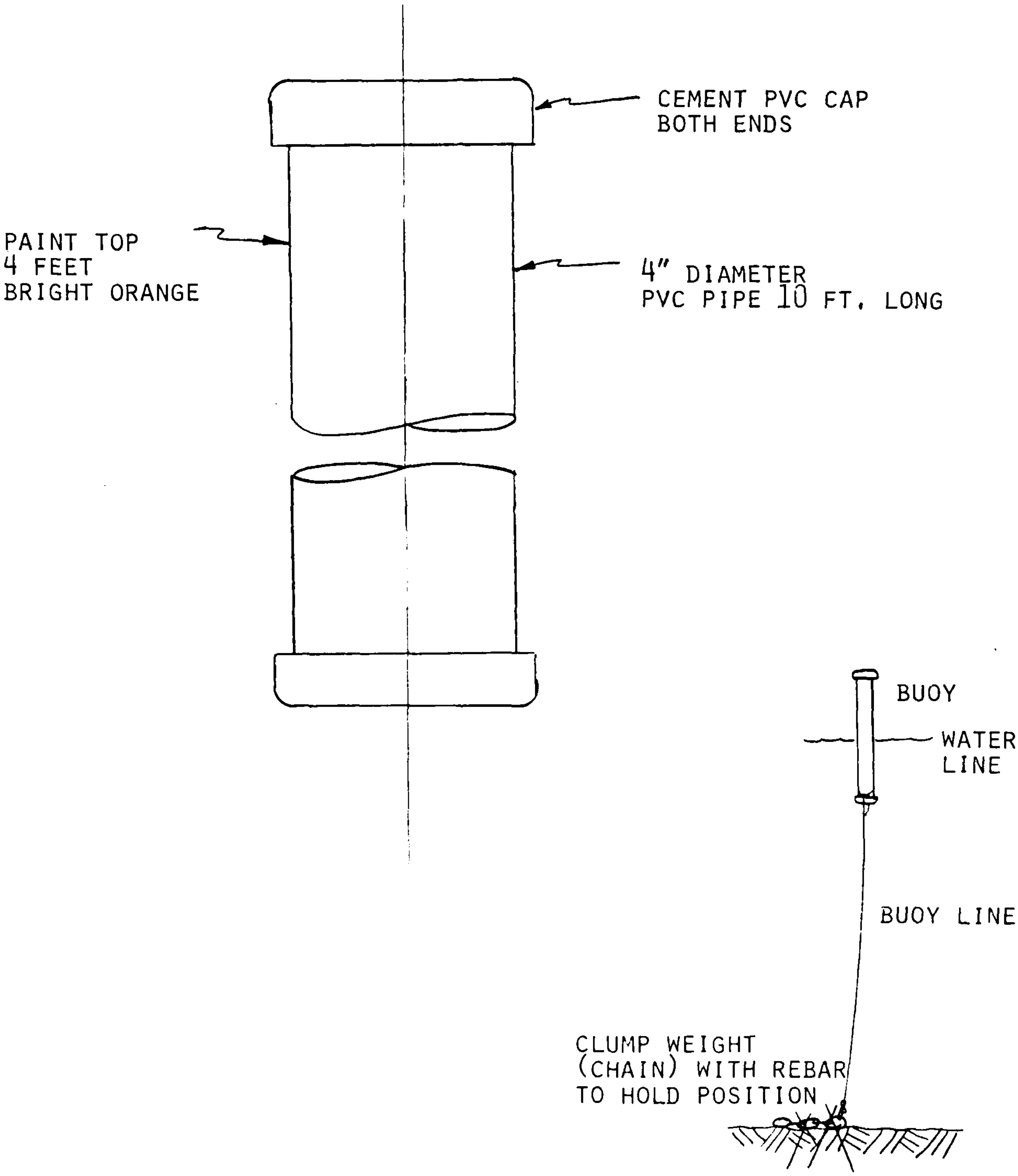


FIGURE 5.5
SPAR BUOY ASSEMBLY
AND INSTALLATION

CABLE TRENCHING - WEST COVE

SOAR cables will be placed in two trenches at West Cove. The SSL cable will be laid in a trench and the WQC cable will be laid in a second trench South and East of the first trench. Each cable trench will be 3 feet deep minimum and have a minimum separation of 30 ft. UCT-2 will be responsible for opening trenches and preparation for cable placement.

The trenching from the beach area to the service road will be accomplished using a backhoe. A majority of this area can be opened prior to SEACON's arrival. The final opening of the beach trench will be completed using a backhoe after the SSL cable (or the UQC cable) is landed. Hand tools and a water jet will be utilized on the beach and in the surf zone.

Each cable passes under an unimproved service road. Cables will be protected in this area by 3 1/2 inch split pipe as shown figure 5.6(b). After opening a trench to approximately 36" deep, sand will be placed in the trench as bedding for the split pipe. Split pipe will be placed in the trench cable laid, then the pipe sections secured. Each end of the pipe will be wrapped with tape prior to covering with local fill. Fill will be firmly compacted.

The subsurface material between the service road and the cable Termination Van (the position of which is presently marked) consists of 6" - 12" of sand over lime stone and shale formations. This material is not easily handled by a backhoe and requires blasting. The Basic Underwater Demolition School (BUDS) located on SCI has agreed to support UCT-2 in blasting operations.

After backhoe operations each trench will be cleared of all rock which may damage cable. Trenches will be smoothed using hand tools. Local sand fill added as required.

BEACH ANCHOR

A dead man type beach anchor will be utilized to secure SOAR cables. The beach anchor will be located towards the beach from the cable turning point. The beach anchor will consist of an H pile section approximately 6 feet long buried horizontally to a depth of 3 feet. Wire rope straps around the H pile section will be connected to tension grips placed on the cables.

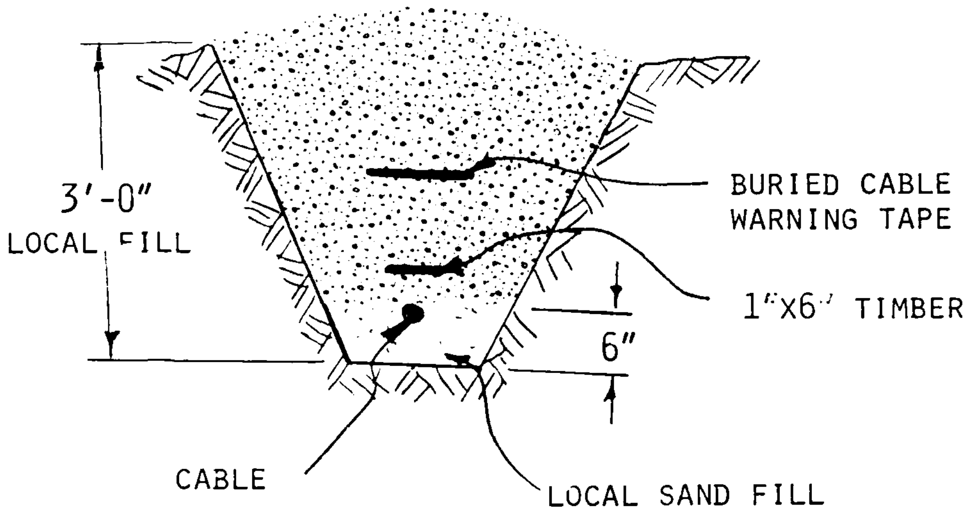
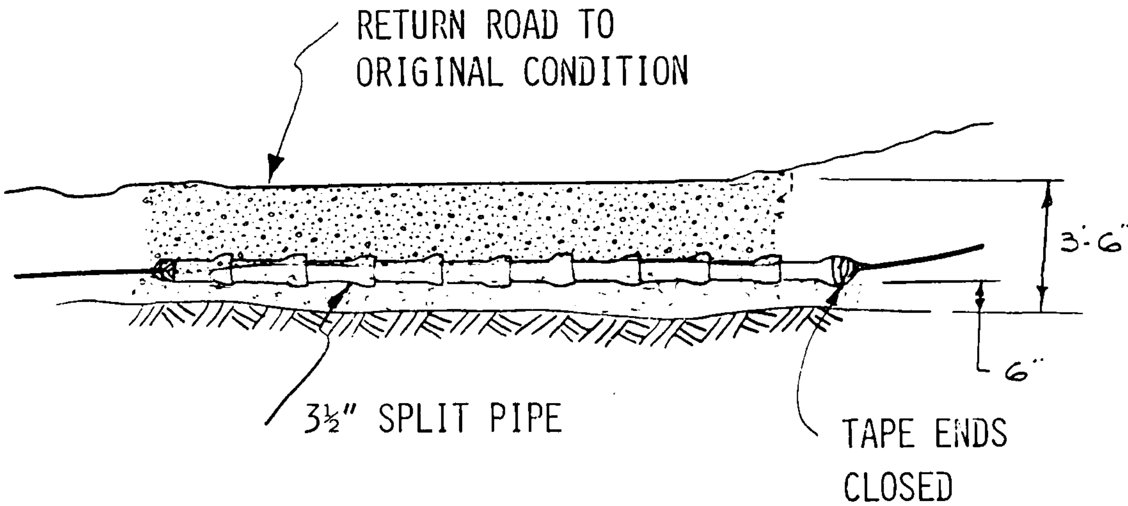


FIGURE 5.6(A)
TYPICAL CABLE TRENCH



5.6(B)
UNDER ROAD CABLE
PROTECTION

SECTION 6, TRAINING

GENERAL

Two days of training are allotted in the schedule to familiarize the installation team with all aspects of the installation process. The installation training will utilize 3.0 NM. of used cable which will be installed and recovered near Pt. Loma, CA.

The SSL training cable will be assembled as shown in Fig 6.1. The cable will be assembled by UCT-2 aboard SEACON and stored on a cable reel. The training cable will be recovered upon completion of the training phase.

NAVIGATION TRAINING

CHESDIV and NOSC Reps will locate and install two Mini-Ranger and two Del Norte shore stations on the beach at Pt. Loma. A predetermined cable track, figure 6.2, will be followed during simulated cable laying. Navigation systems will be utilized as described in Section 11.

CABLE LANDING

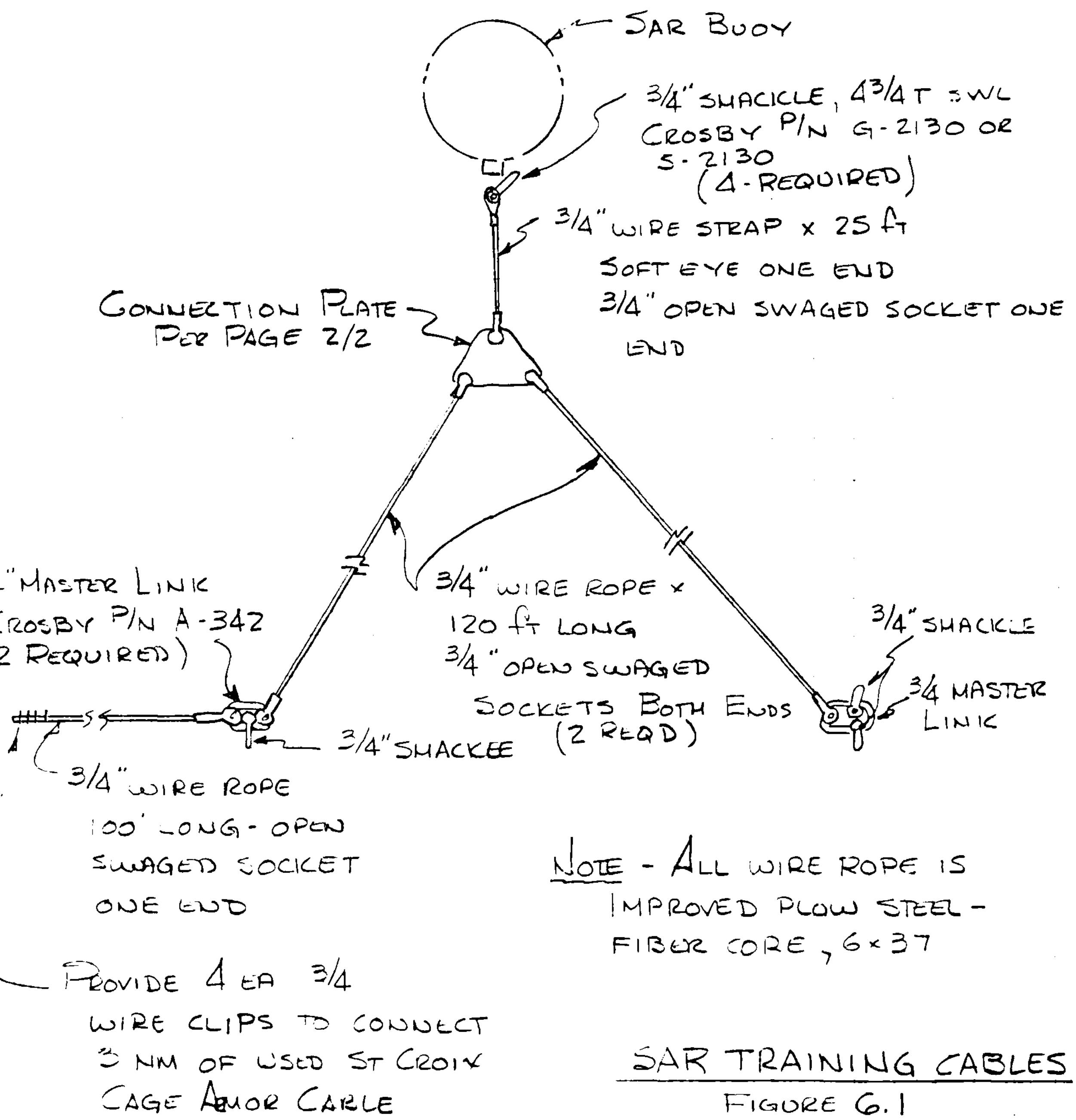
SEACON will maintain a predetermined position approximately 1200 ft. off the beach. The UCT-2 Zodiac boat will pick up a line attached to the cable and begin pulling the cable from SEACON towards the shore.

The cable will be led from the reel stand to the Cable Engine as shown in figure 4.1. The Cable Engine operator (one Tracor and two UCT-2 personnel) will pay out cable as UCT-2 personnel assembled at the stern of SEACON affix cable floats at an interval of 25 ft.

The cable will be paid out to a point where the cable can be secured to a boat anchor on the beach. If necessary, due to surf conditions, a line will be secured to the cable and passed to the beach anchor by a UCT-2 swimmer.

Swimmers from the Zodiac will then cut loose float balloons beginning at the shore end and drop the cable to the sea floor. After the floats are dropped SEACON will begin laying cable towards the sea.

CHESAPEAKE DIVISION Naval Facilities Engineering Command NDW DISCIPLINE	PROJECT: SAR Station: SAN CLEMENTE ISLAND
Calcs made by: COOPER date: 4-24-4	E S R: Contract:
Calcs ck'd by: date:	Calculations for: TRAINING CABLE ASSEMBLY



NOTE - ALL WIRE ROPE IS IMPROVED PLOW STEEL - FIBER CORE, 6×37

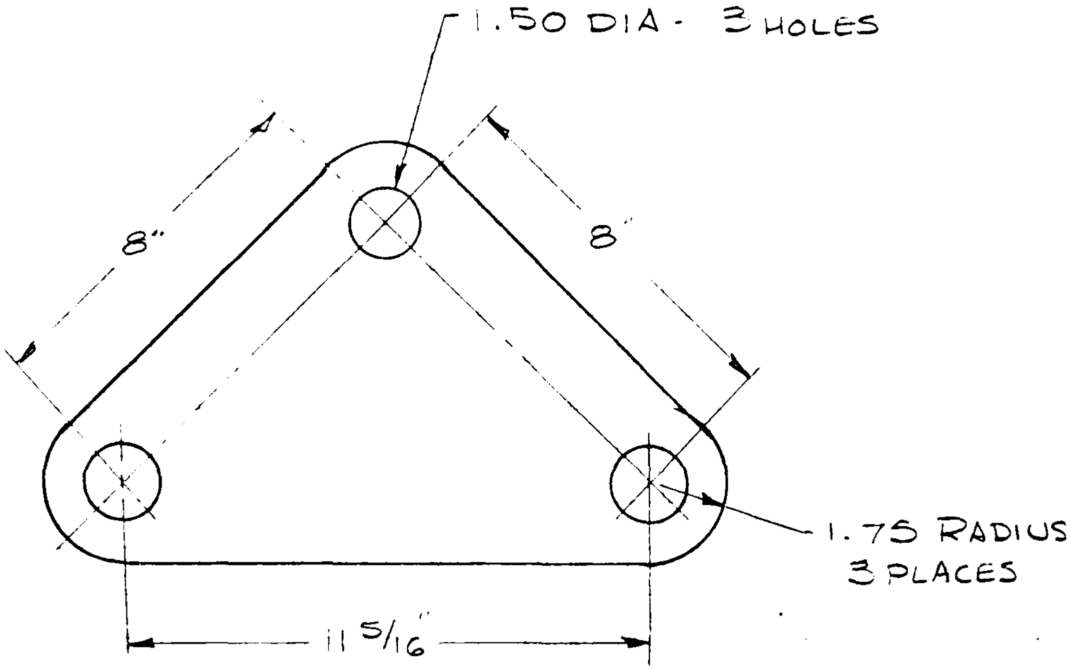
SAR TRAINING CABLES

FIGURE 6.1

page 1 of 2

GPO 942-951

CHESAPEAKE DIVISION Naval Facilities Engineering Command NDW DISCIPLINE	PROJECT: SAR Station: SAN CLEMENTE E S R: ______ Contract: ______
Calcs made by: C COOPER date: 4-24-4 Calcs ck'd by: ______ date: ______	Calculations for: TRAINING CABLE CONNECTION PLATE



MATERIAL: 1.25" THICK PLT
A36 STEEL

FINISH: SHOP COAT PRIMER.

CONNECTION PLATE

page 2 of 2

GPO 942-951

CABLE LAY

SEACON will lay cable as shown in Fig 6.2. During the cable lay the winch operators will control pay out rates as directed from the control room. Ship's position will be controlled to follow a specific predetermined cable path. SEACON will hold position at a predetermined point in order to simulate the clump lowering point.

SSL DEPLOYMENT

The SSL training cable will be deployed in a manner similar to that described in Section 7, SSL Cable Deployment. The major difference being that the SSL electronics package will not be installed and that water depths will be greatly reduced from those at the actual installation site.

The clump lowering line on the hold back leg will not be released. This line will be used to recover the clump and subsequent SSL package buoy, and SSL training cable.

All training cable and components will be recovered.

CRITIQUE

After each training day, all members of the SOAR deployment team will be assembled aboard SEACON to review the days operations. Constructive comments leading to changes in the operations plan will be considered at that time.

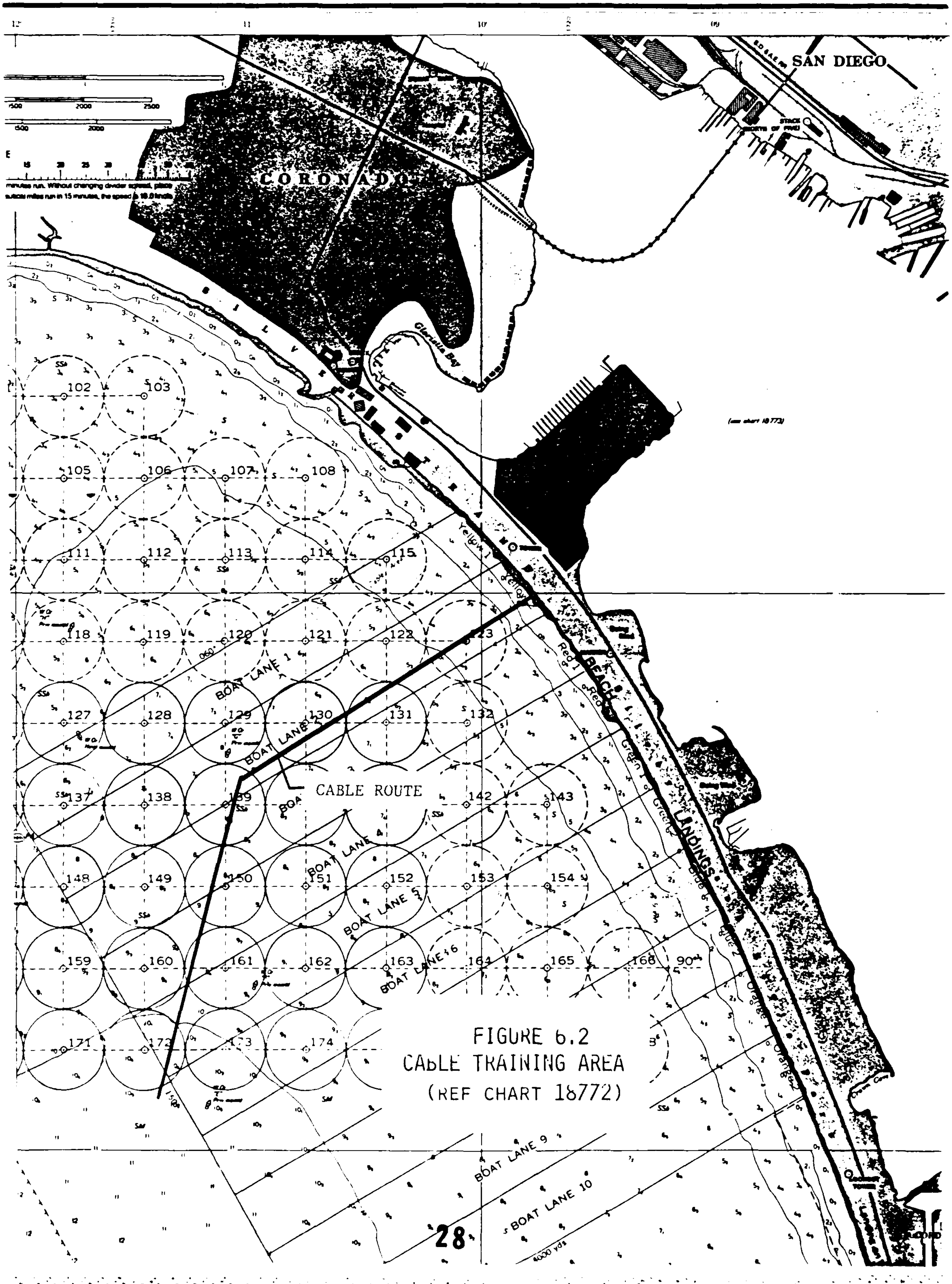


FIGURE 6.2
CABLE TRAINING AREA
(REF CHART 18772)

SECTION 7, SSL INSTALLATION

PREPARATION

In preparation for the SSL cable deployment a series of tests and equipment checks will be performed as shown in table 7.1

ITEM	RESPONSIBILITY	DESCRIPTION
SSL	NUSC	Cable and electronics test (SEACON) approval for deployment
SSL	NUSC	Mechanical assembly (SEACON)
SSL	NUSC	SCI electronics equipment for cable test during deployment (Fig 7.1)
SEACON equip	CHESDIV	All deck equipment is operable, fueled, spares available
Deck gear	UCT-2	All rigging equipment and tools are prepared
Small boat	UCT/SEACON	SEACON'S small boat is fueled and operational
Navigation	CHESDIV/NUSC	SCI stations and SEACON stations are operational
Batteries	NOSC/UCT	All navigation batteries are charged and labeled

TABLE 7.1 SSL PREPARATIONS AND TASKING

The UCT-2 POIC aboard SEACON will be responsible for all floats, slings, tag lines and auxiliary rigging required to overboard the SSL cable and buoy. He will ensure that the required items, spares, and small tools are assembled near the stern of SEACON. The POIC will make available life work vests for all personnel working near the stern of SEACON. Hard hats and steel toed shoes will be required for all deck personnel.

The SSL cable will be routed through the power block and the cable engine in preparation for deployment as shown in Fig 7.2. A 1 inch diameter, 1800 ft. long polypro line, used to pull the cable ashore shall be placed at the stern of SEACON and prepared for overboarding. The pulling line shall be connected to the cable tension grip using a swivel.

The CHESDIV Engineer and NUSC Rep aboard SEACON will be responsible for a thorough check of all navigation systems and communication links to SCI and aboard SEACON.

The location of major components aboard SEACON for the deployment the SSL (and WQC) are shown in figure 4.1 "SEACON Deck Layout".

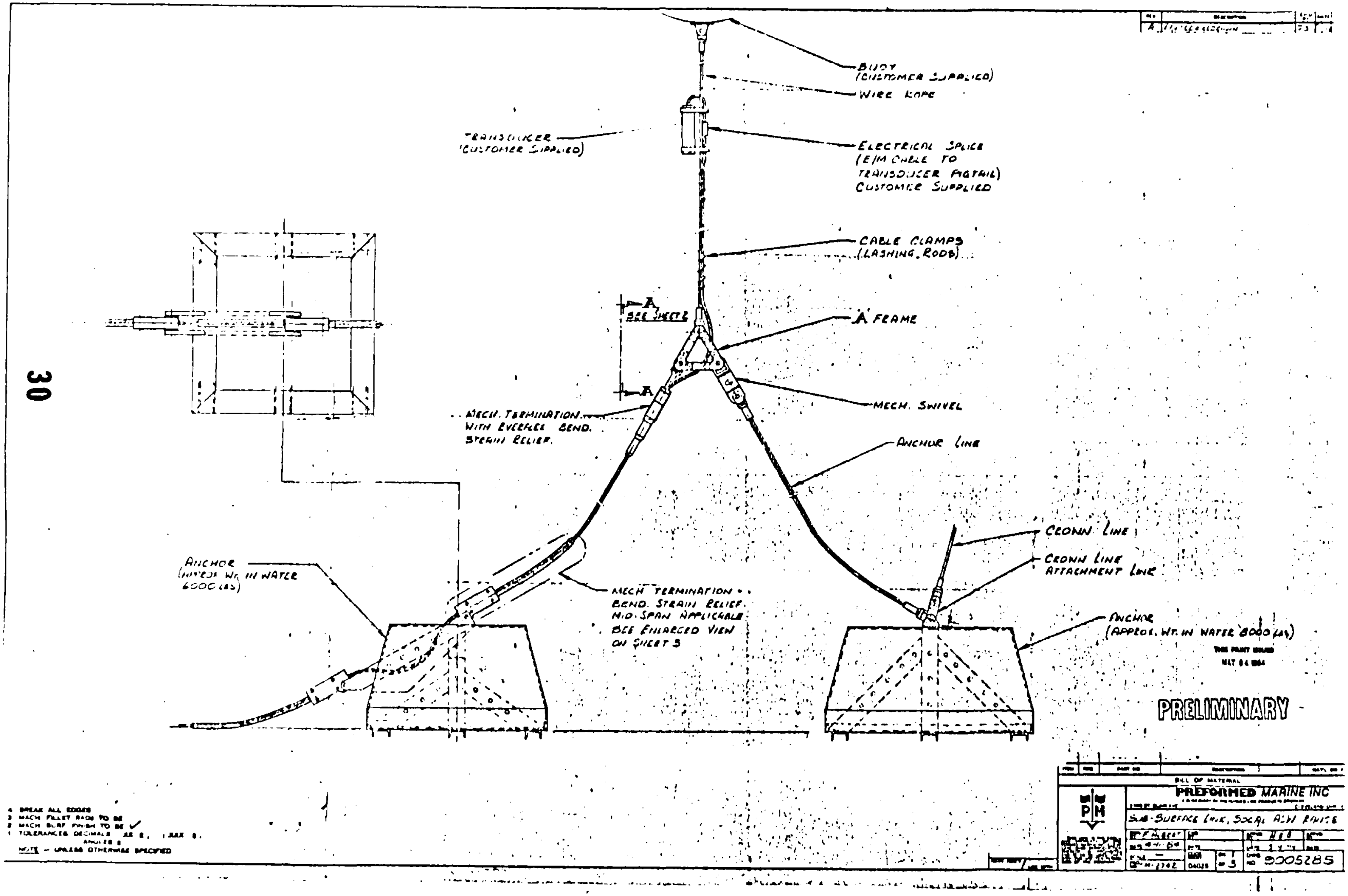


FIGURE 7.1 (A)
SSL ASSEMBLY

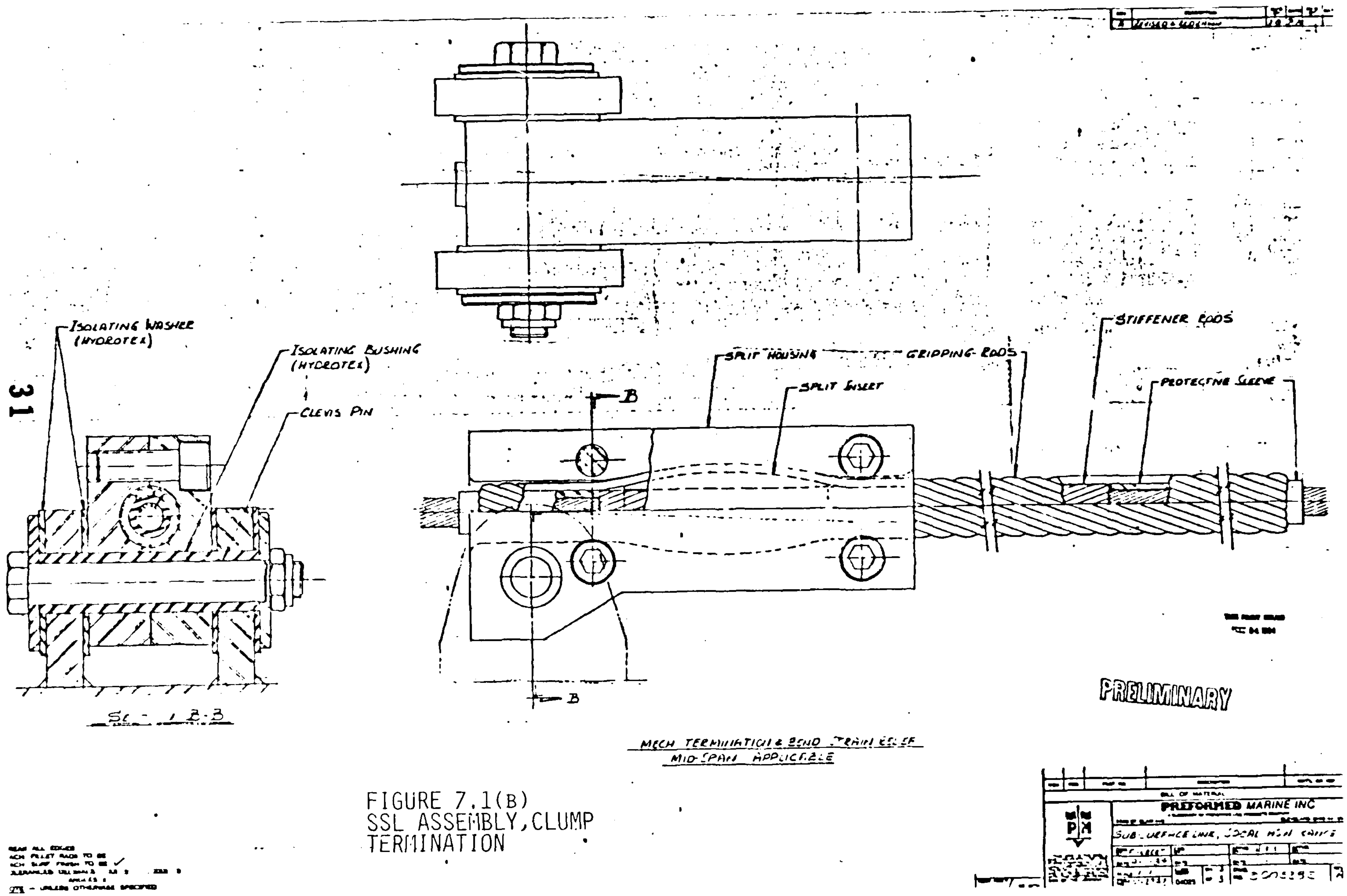


FIGURE 7.1(B)
SSL ASSEMBLY, CLUMP
TERMINATION

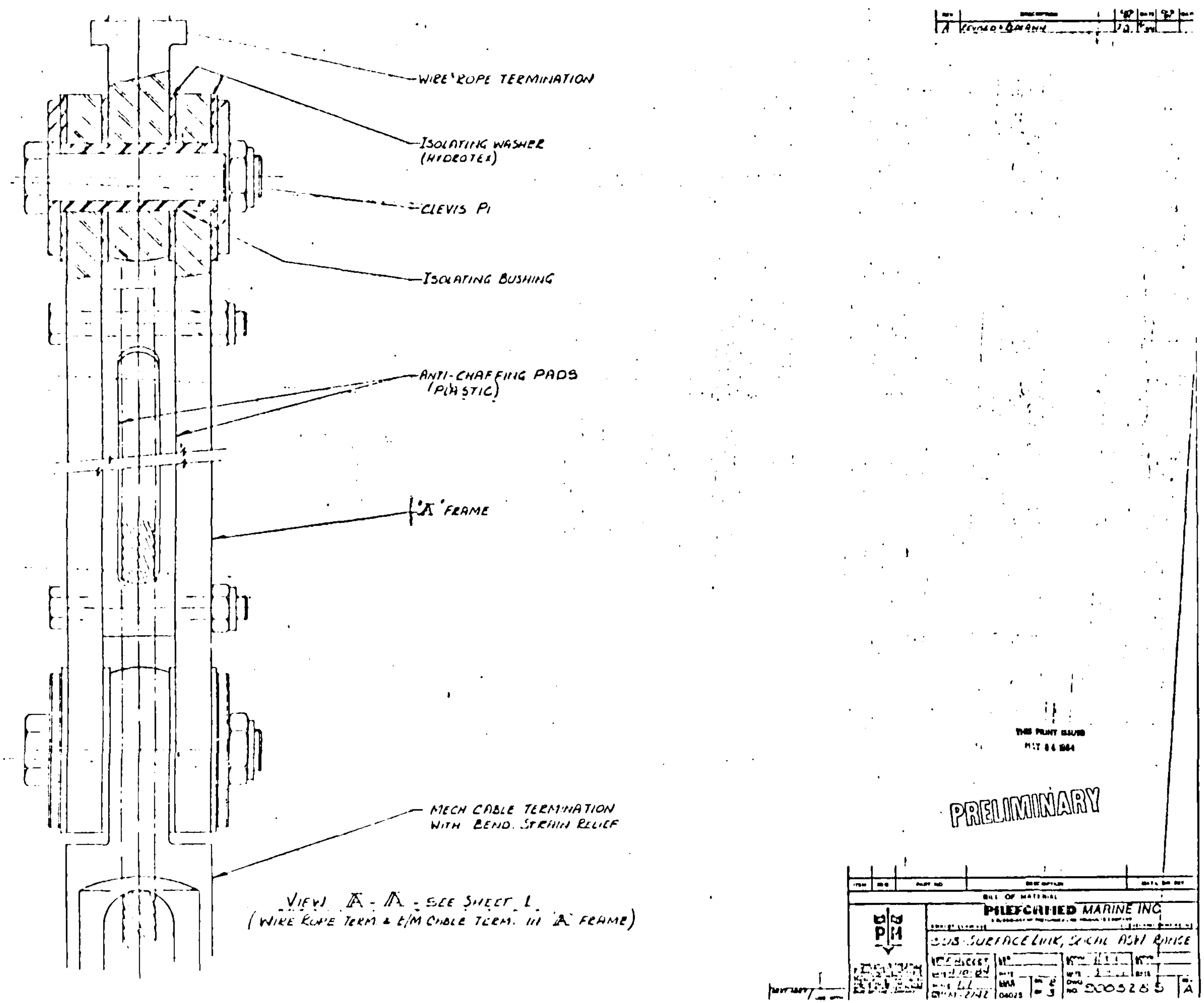


FIGURE 7.1(c)
SSL "A" FRAME
ASSEMBLY

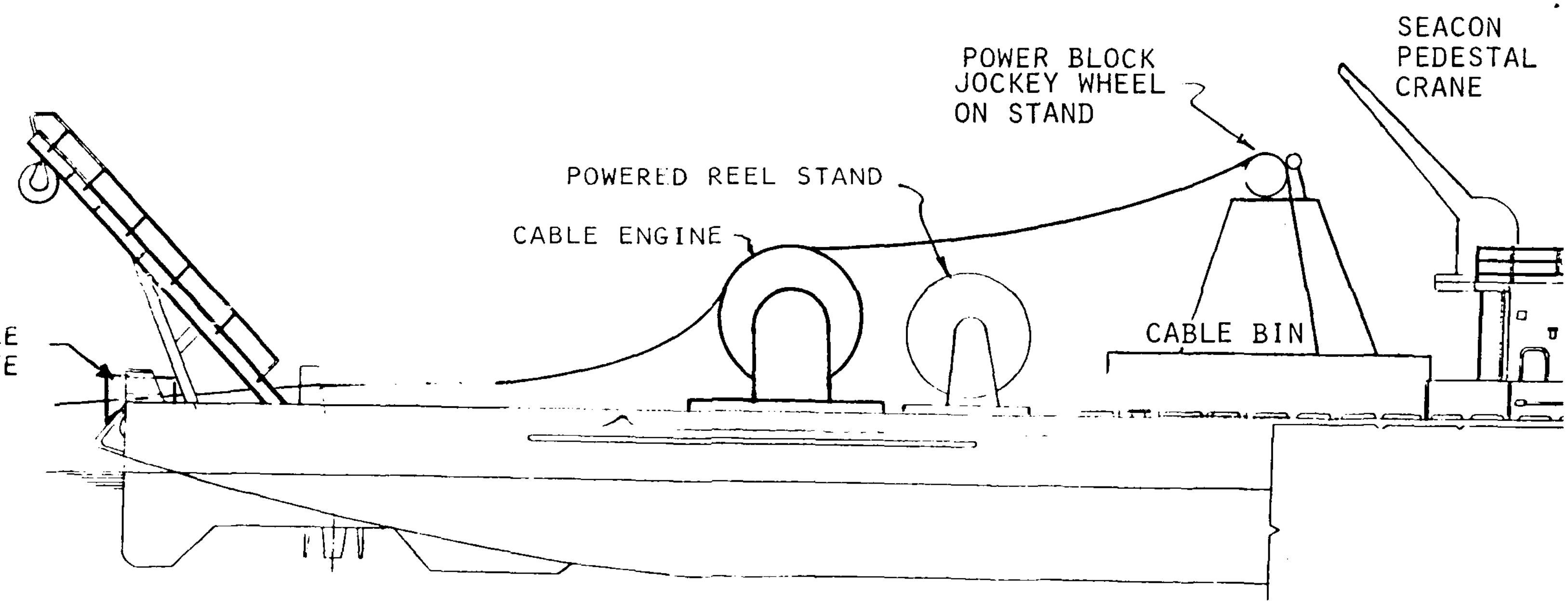


FIGURE 7.2
SSL CABLE ROUTE
ABOARD SEACON

The UCT-2 POIC of West Cove operations will ensure that all equipment is fueled and operable. Cable trenches must be clear and ready for cable placement. Timber for coverage of cables shall be laid along the cable tracks. The POIC shall check all radio nets and assemble spare radio batteries.

SHORE LANDING OF SSL CABLES

SEACON will be positioned on line with the cable track and 1200 feet off shore. SEACON will maintain position during the shore cable deployment.

The 1 inch polypro cable pulling line will be passed from SEACON to a Zodiac or LARC-5 craft then passed ashore, through the beach sheave, and to the pulling winch. Refer to figure 7.3. The SCI winch operator will wrap the line around the capstan and standby for signals from the POIC ashore.

The SCI winch operator will be signaled by the POIC to take up cable slack. Upon a radio signal from the control room the cable engine operator will begin to pay out cable. As cable is paid out towards shore UCT-2 personnel will tie floats to the cable every 25 ft. As the cable moves up the beach the SCI UCT-2 personnel will remove the floats.

During the cable shore landing, the Cable Engine pay out rate will be approximately 100 FPM.

The SCI POIC will follow the cable end up the beach. Particular attention shall be paid to the passage of the cable through the beach turning sheave. The SCI POIC will advise the SEACON of the cable progress during the shore landing. The cable pull will be terminated when the cable reaches the cable pulling winch. The Pengo winch will be stopped by a signal from the control room.

With the cable stopped and floating, the UCT dive team will begin to remove cable floats from the shore towards the SEACON. The floats will be removed as divers lay the cable along the cable path previously marked by the underwater yellow polypro line. As floats are removed, SEACON will hold position.

As the last floats are removed SEACON will begin to move seaward, laying cable toward the SSL site.

When SEACON departs, the SCI crew will pick up any loose cable floats and prepare for the next cable landing. The pulling line will be passed through the sheave and coiled near the beach landing site.

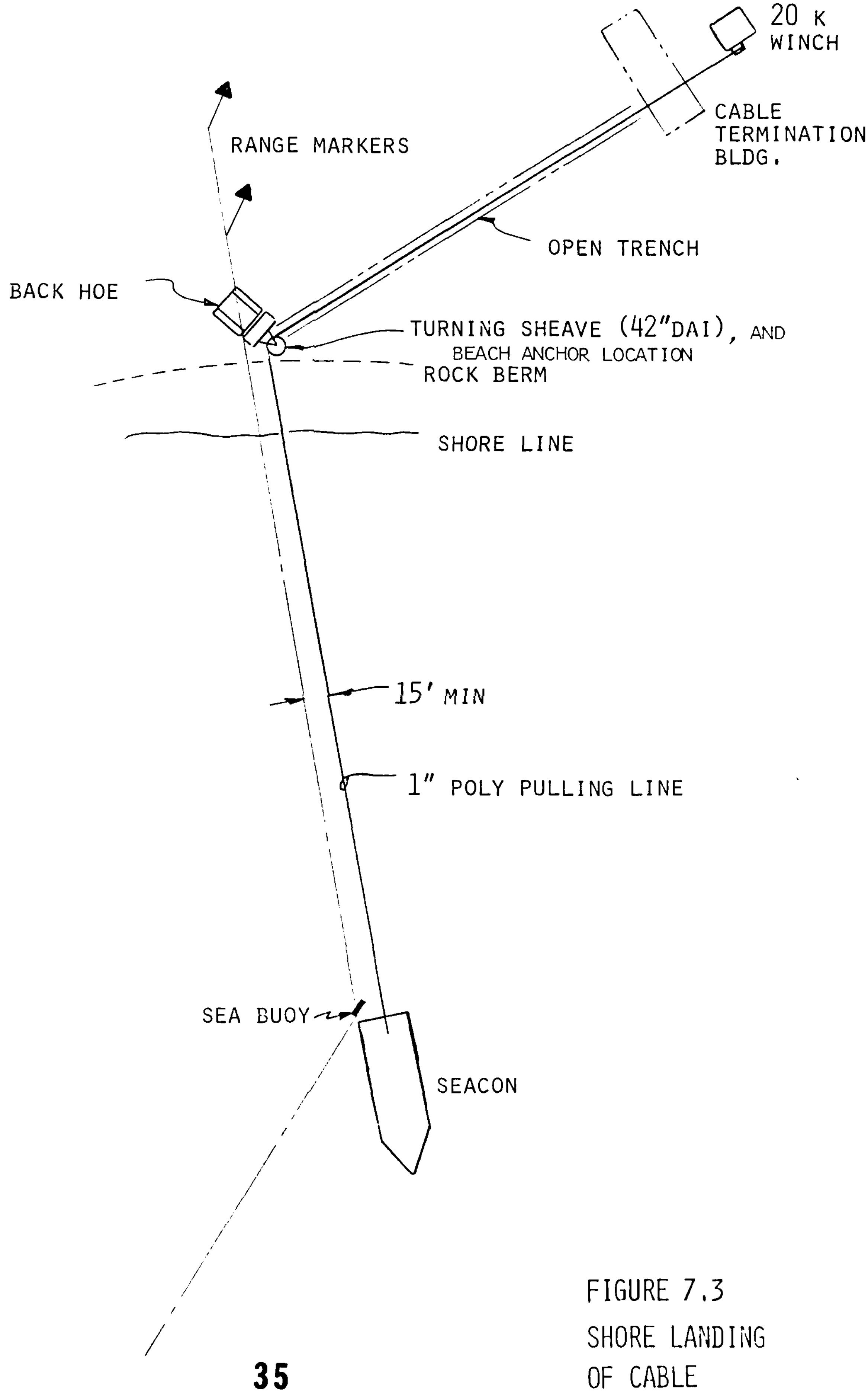


FIGURE 7.3
SHORE LANDING
OF CABLE

CABLE DEPLOYMENT

Upon completion of the cable landing, SEACON will proceed seaward to the SSL site. The cable route and cable pay out rates are documented in Section 12. SEACON will hold position approximately one mile from the SSL clump deployment site.

During the cable lay, preparations will be made for overboarding the clump, SSL buoy, and electronics package.

CLUMP CONNECTION AND OVERBOARDING

Cable will be paid out until the clump connection begins to come out of the cable bin. The cable engine operator will stop the cable payout. UCT-2 deck crew will then install a wire wrap cable stopper (PLP) at a point aft of the cable engine. A line from the deck winch will then be lead as shown in figure 7.4. The deck winch will lower the cable as the cable engine operator pays out cable and passes the clump connections through the Cable Engine. During this phase the weight of the cable will remain on line from the deck winch. The clump connection will be stopped midway between the stern and the cable engine.

The bosun will operate the gantry crane and move its hook over to the clump weight. The hook to clump connection will be made using a 4 part sling constructed from 1 inch diameter synthetic line. Tag lines will be secured to the clump, passed around deck cleats, and manned by UCT-2 personnel. The clump weight will be lifted 6 inches above the deck and moved to a position inside of the stern A frame. Note: Special care must be taken, ie extra tag lines, to maintain total control of the clump to avoid hazards to personnel or cable.

NUSC personnel, assisted by UCT-2, will complete the cable to clump connection.

The gantry crane will slowly lift the SSL/EM clump and swing over the stern until the clump is suspended by the cable. With slack in the crane lift wire, the crane hook will be removed from the clump sling and the hook returned to the stowed position. Refer to figure 7.5.

The deck winch will slowly payout line and thus transfer the cable weight to the clump connection. UCT-2 personnel will then cut the synthetic line.

The SEACON will proceed down the cable track toward the clump touch down position, as prescribed in Section 12 " Cable Payout Data", until the next hold point is reached. Markings on the cable and the cable counter will be used to determine when enough cable is out to assure the clump is on the bottom. SEACON will hold position while the SSL is overboarded.

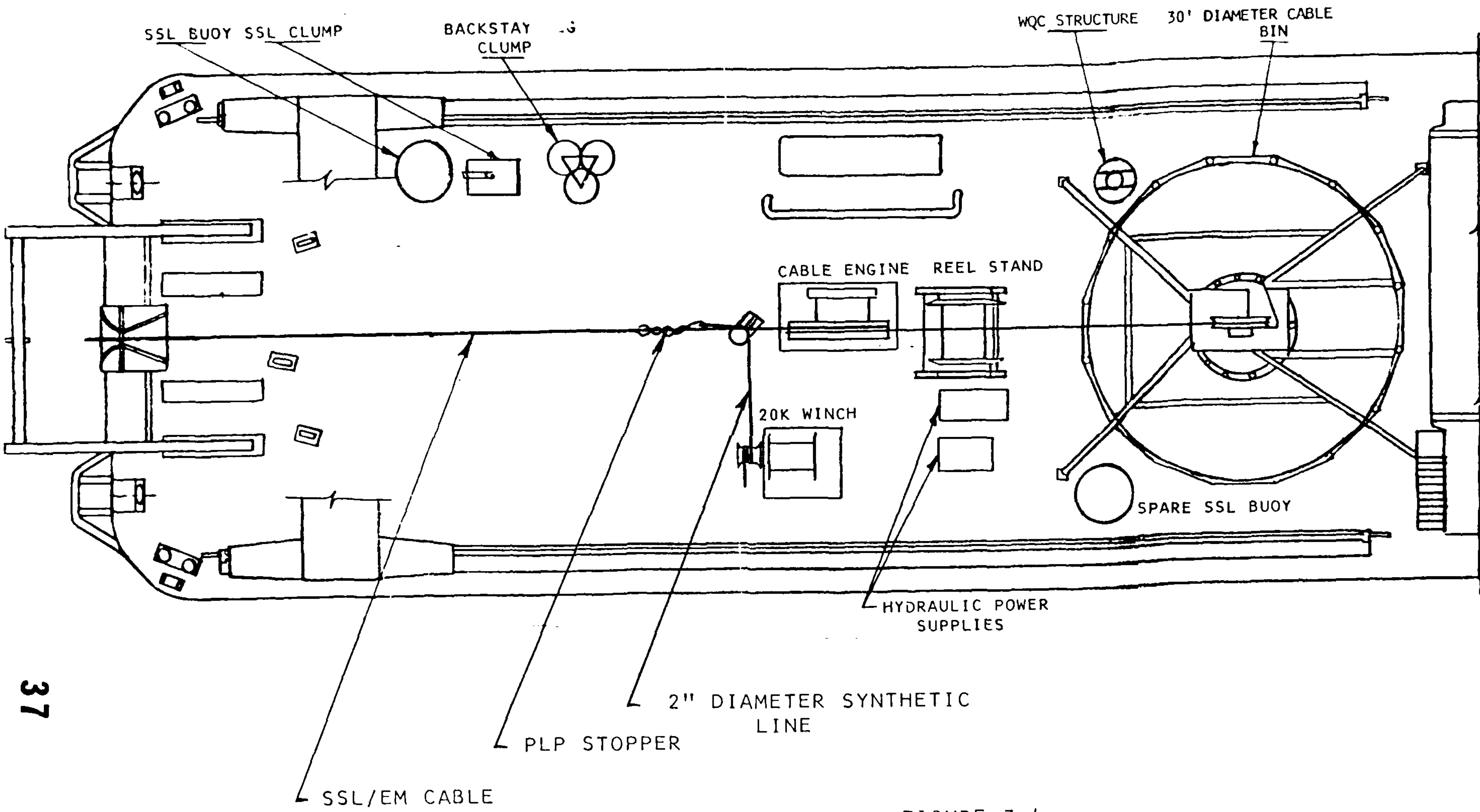


FIGURE 7.4
SSL/EM CABLE HELD ON DECK

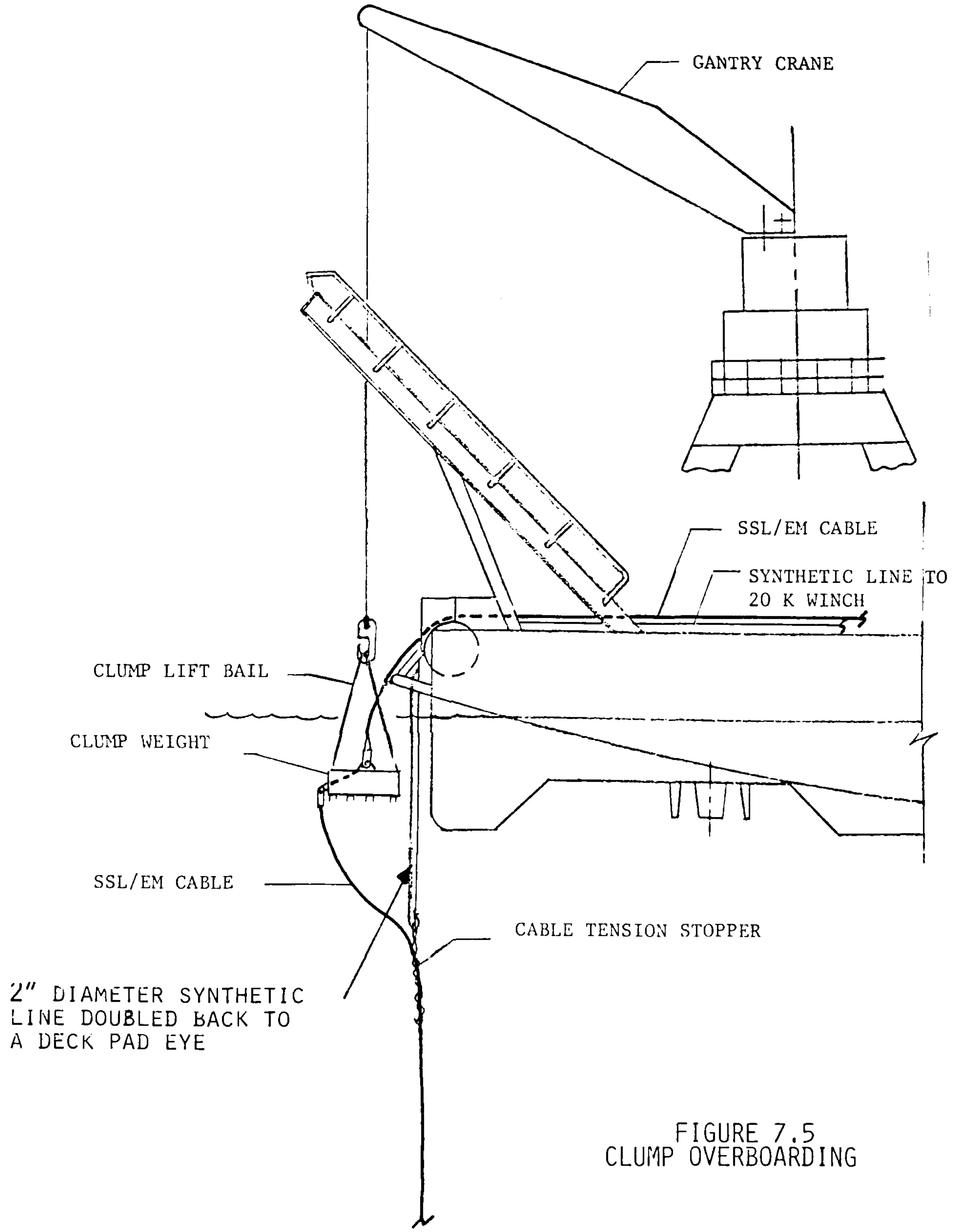


FIGURE 7.5
CLUMP OVERBOARDING

SSL OVERBOARDING

Refer to figure 7.6 "OVERBOARDING SSL"

SEACON'S small boat (MonArc) will be required for the SSL overboarding. SEACON'S Captain will determine the proper time to overboard the boat.

SEACON will hold position as the cable engine winch pays out EM cable until the cable A frame PLP connection is exposed in the cable bin. Secure a cable stopper (PLP) aft of the cable engine. Serve the end of the stopper and tape the area.

Route a 2 inch diameter synthetic line from the auxiliary deck winch through blocks and doubled through the PLP stopper. The deck winch line will then take up the load of the SSL/EM cable and hold it in position.

In preparation for overboarding the buoy and electronics, the EM cable will be removed from the Cable Engine winch and laid out on the aft deck next to the cable engine. The backstay leg will be passed from the reel stand and through the winch. The SSL A frame connections and final assembly of the SSL will be made at this time as shown in figure 7.1, SSL Assembly. The CHESDIV Engineer and the NUSC representitive will conduct a final inspection of the SSL hardware and confirm the proper fit and function of the assembly

The gantry crane hook will be connected to the upper connection of the buoy using a shackle and a 25 ft. long 1" wire sling. The buoy, with tag lines secured, will be moved to the stern, and held over the starboard quarter 3 feet above the water. Connect the buoy wire to the connection above the SSL Electronics.

The Monarc boat will standby near the stern of SEACON. A 1" diameter braided line (approximately 75' long) passed to SEACON will be doubled through the top connection of the buoy and returned to the small boat. The gantry crane will lower the buoy into the water and release it. The Monarc boat will then slowly pull the float away from SEACON's stern.

The loop of EM cable and the SSL electronics will be passed over the side <u>by hand</u> as the Monarc boat pulls away from SEACON. A light strain will be maintained on the float and cable. The SSL/EM cable will be deployed by lowering the cable using the deck winch to a point where the SSL back stay leg connection to the cable A frame is approxiamtely 3 feet forward of the cable chute. The backstay leg will be lead from the cable reel, through the cable engine and connected to the SSL cable A frame. The deck winch will slowly lower the cable as the cable A frame connection is passed through the cable chute. The cable engine operator will take up tension on the backstay leg. The bitter end of the synthetic line on the SSL Cable Stopper will be cut and pulled back aboard by the 20K winch.

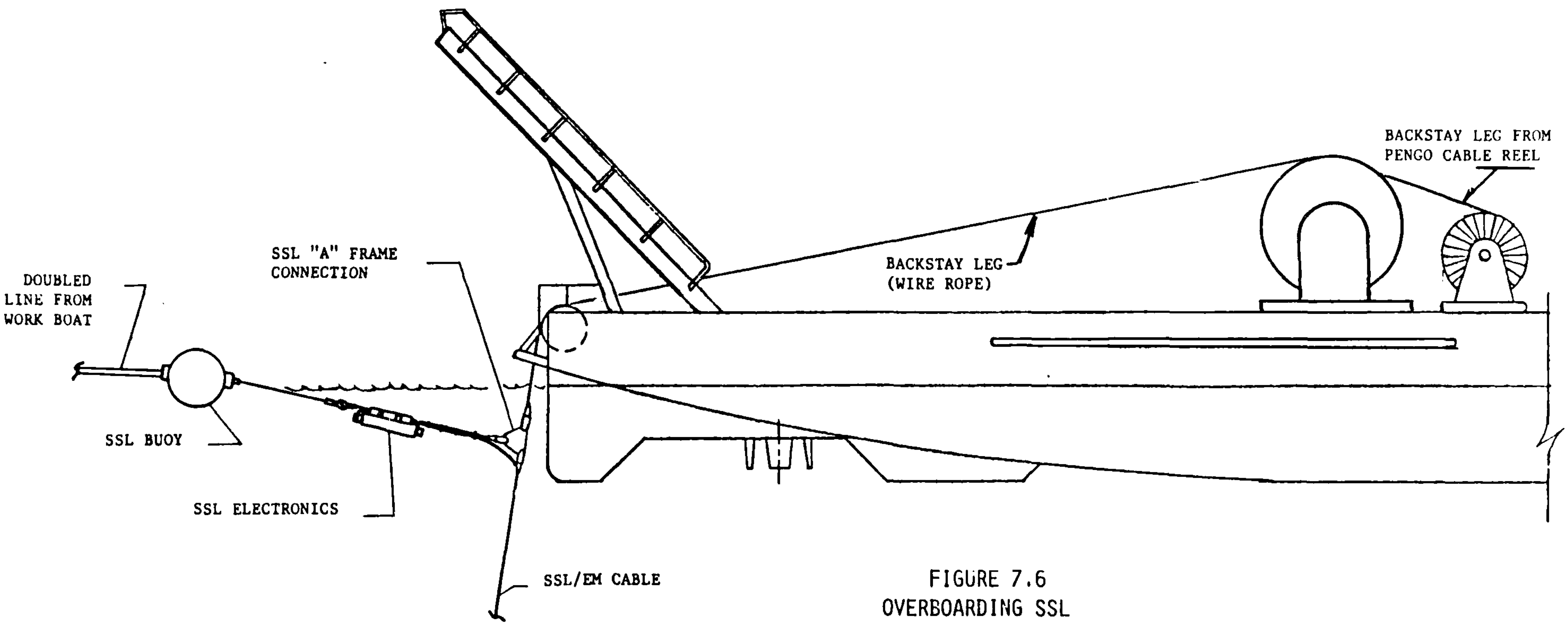


FIGURE 7.6
OVERBOARDING SSL

SEACON will move towards the backstay leg clump deployment site as the backstay leg is paid out.

UCT-2 personnel aboard the the Monarc boat will remove the shackle and lifting sling from the buoy upon a signal from the control room.

The gantry crane, will move the backstay clump into position at SEACON's stern inside of the A frame. As SEACON holds position, a PLP stopper will be applied to the backstay leg approximately 30 ft. forward of the backstay clump connection. A 2 inch diameter synthetic line to the PLP from the deck winch will hold the backstay leg and allow the backstay clump to be connected. The CHESDIV Engineer and the NUSC representitive will check all connections for proper fit.

The gantry crane will lift the clump over the stern using a 20' x 1" wire sling. The backstay leg will be slacked until the clump load is taken up by the grapnel line and the cable engine. Release the clump from the gantry crane hook and cut the 2 inch diameter synthetic line which goes to the PLP stopper.

The cable engine operator will lower the clump. During the lowering process SEACON will be moved beyond the clump position. The Cable Engine cable counter will be monitored for amount of cable out thus indicating the clump is on the bottom. The cable engine operator will continue to maintain tension on the line in order to avoid the possibility of interference with SEACON's propulsion units.

NUSC personnel stationed ashore will monitor the depth of the electronics package and advise SEACON (via UCT-2 Shore POIC radio net) of the SSL depth. The design depth of the SSL is 1700 FSW $\pm$ 100 FSW. The SSL depth is controlled by the position of the backstay clump. The SSL depth will be monitored for 30 min. If the SSL is not at the proper depth, the clump will be lifted from the bottom and then repositioned by moving SEACON. Adjustments will be made until the NUSC shore team advises SEACON that the SSL is at the proper depth.

With the backstay clump in its proper position, SEACON will slowly move towards the lowering point for the grapnel anchor. A 2" diameter synthetic line will be used as a lowering line. The line will be routed from the powered reel stand as shown in figure 7.7. A 10,000 lb. capacity acoustic release will be connected to the lowering line. The acoustic release must be tested prior to overboarding. Upon completion of a successful test, the release will be connected to the grappnel line clump.

With tag lines attached to the grappnel line clump, the Cable Engine will lift the grappnel line clump overboard. SEACON will proceed to the clump drop position (refer to section 12) as the clump is lowered. At the correct position, the release command will be activated and release line returned to the surface.

This completes the SSL installation process.

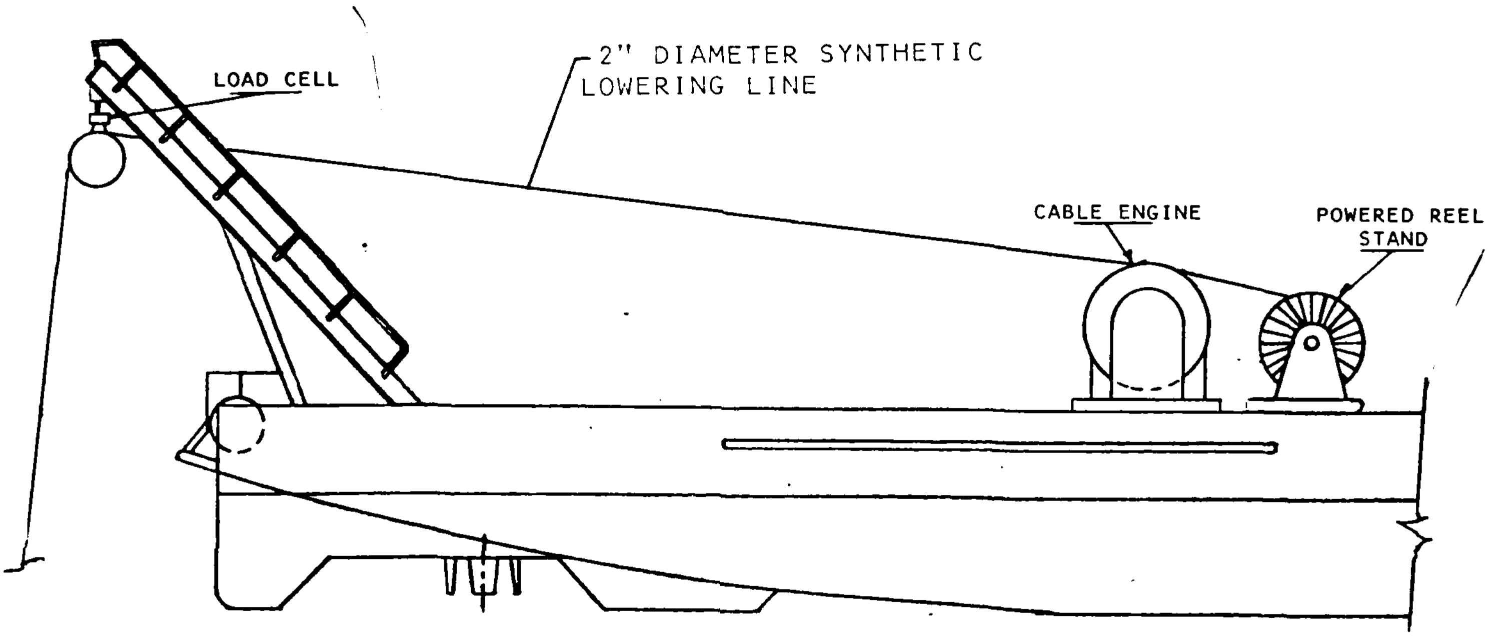


FIGURE 7.7
SYNTHETICE LOWERING LINE
ARRANGEMENT

SECTION 8, WQC INSTALLATION

GENERAL

The WQC system installation will begin with the landing of the shore cable followed by the installation of the WQC structure (refer to figure 8.1) at the at sea site. The WQC will be lowered to the sea floor by a line attached to an acoustic release. The system will be continuously monitored from shore during the installation.

WQC INSTALLATION

The shore landing of the WQC cable will be similar to that as described in Section 7. Floats on the WQC cable will be attached every 20 ft. Cable will be deployed from the SEACON cable bin.

SEACON will proceed to the deployment site laying cable as described in Section 12, Cable Payout Data. SEACON will hold position at a point approximately 1.0 NM from the deployment site. The cable will be secured by application of a cable stopper at a point when the last loop of cable begins to exit the cable bin. A synthetic line will be passed from the deck winch, to the stopper. The winch operator will then take up a strain on the line thus releasing tension on the WQC cable which remains on the cable engine.

The UCT-2 deck force will remove the cable from the cable engine and the remaining cable from the cable bin. The cable will be laid on deck.

NUSC personnel aboard SEACON will confirm the WQC connector is properly assembled and confirm the WQC is working properly prior to overboarding.

The WQC lowering line will be lead from the powered reel stand, and through the cable engine, as shown on figure 7.7. A 10,000 pound capacity acoustic release will be attached between the WQC structure and the lowering line. CHESDIV personnel will test the acoustic release and confirm its proper operation. The WQC will be rigged for overboarding a shown in figure 8.2, with tag lines attached.

SEACON'S gantry crane will be used to lift the WQC structure to the stern and centered on the A frame. The acoustic release will be attached to the WQC structure using a 1" diameter synthetic line pendent. Seacon's gantry crane will lower the WQC structure until the load is taken up by the lowering line.

The line holding the WQC cable will be slowly lowered until the weight of the cable is born by the WQC lowering line. The synthetic line holding the WQC Cable will be cut at the bitter end and recovered using the 20K deck winch.

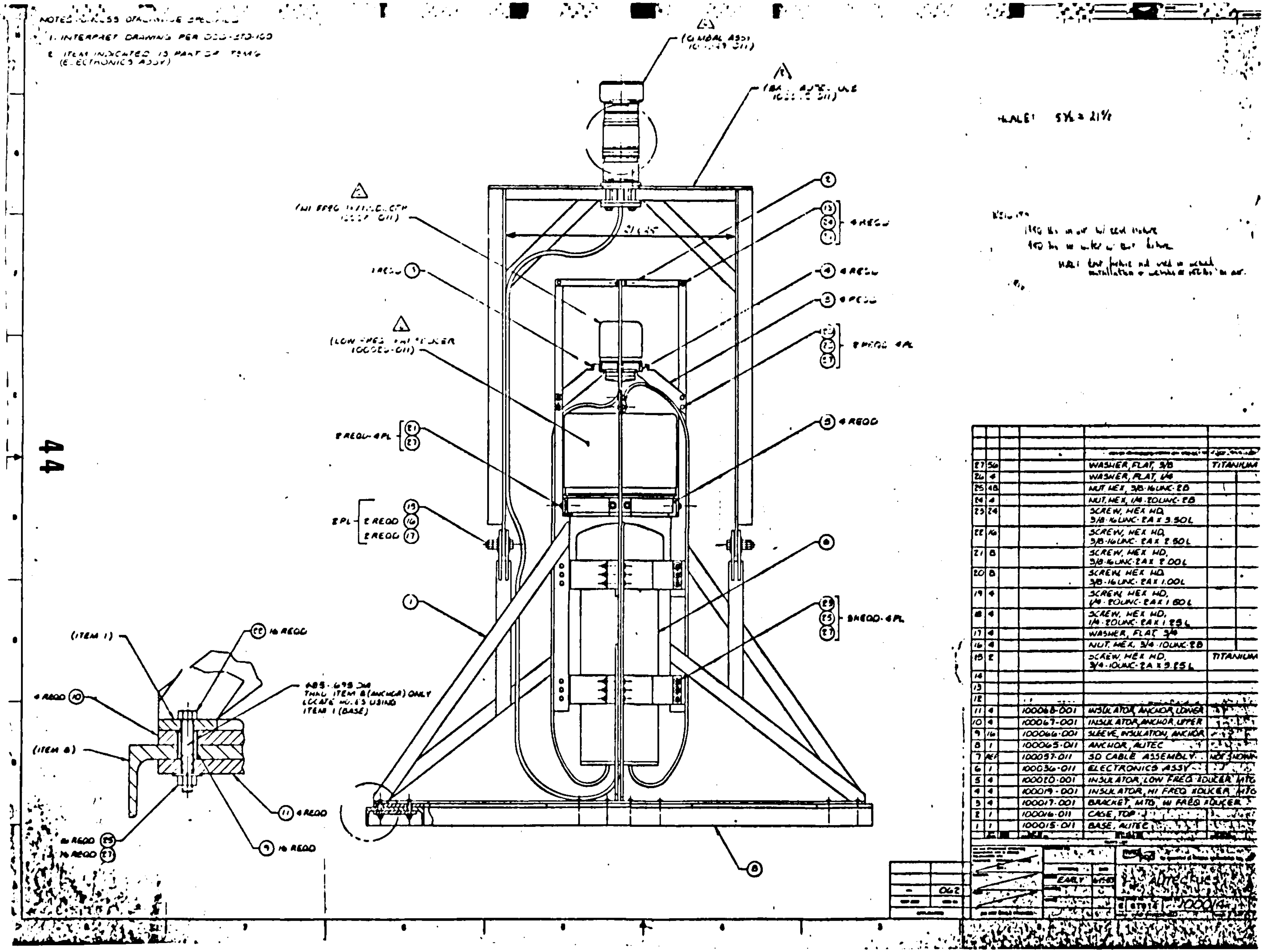


FIGURE 8.1

WQC STRUCTURAL ASSEMBLY

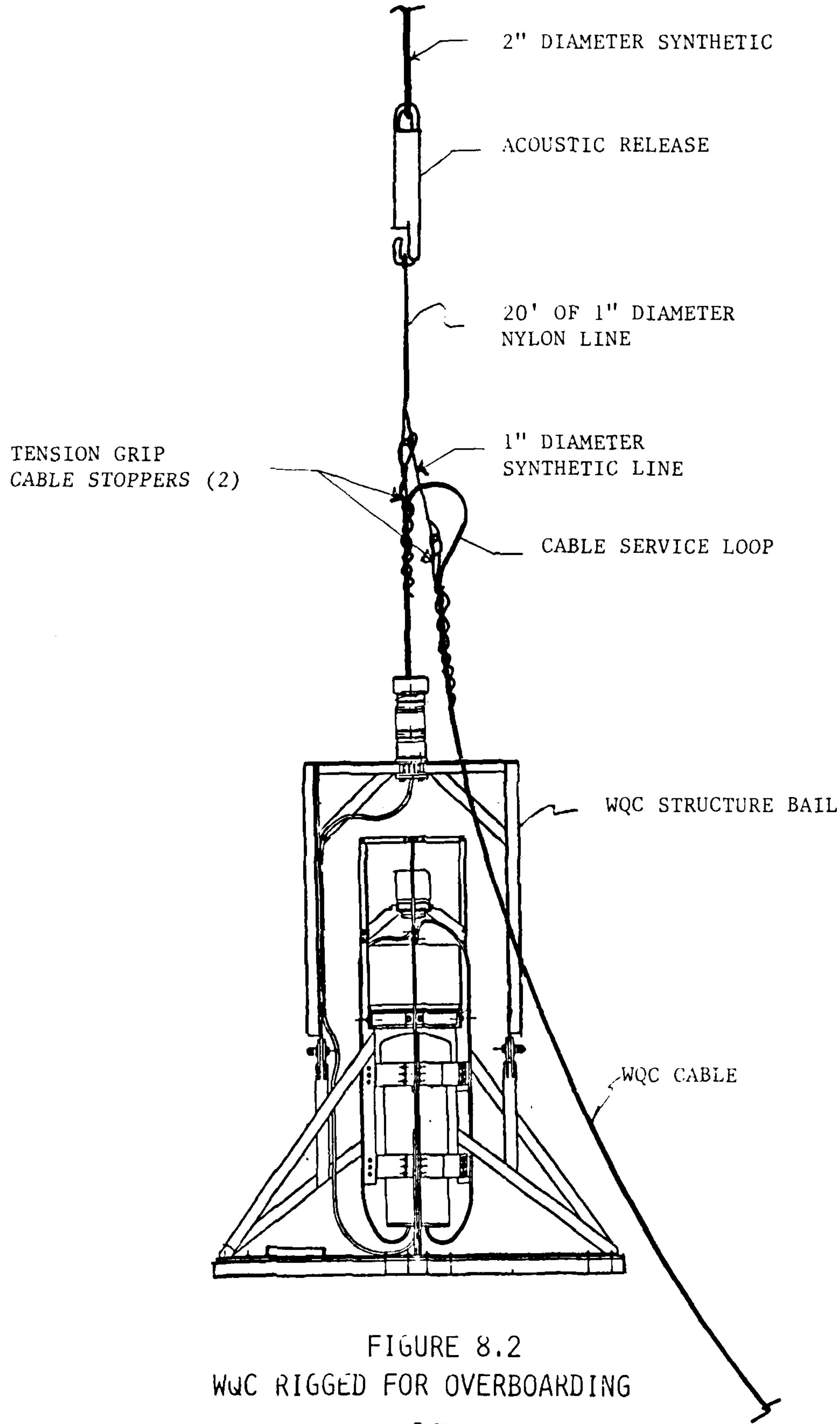


FIGURE 8.2
WQC RIGGED FOR OVERBOARDING

As the WQC is lowered to the bottom, NUSC technicians on SCI at the shore end of the cable will monitor the WQC transponder signal. The cable engine cable counter will be monitored to confirm the altitude of the WQC off the bottom. The load cell on SEACON'S A frame will be monitored for structure and line weight near the bottom.

With SEACON holding position at the WQC site, the WQC will be lowered to the bottom. NUSC technicians on SCI will confirm the WQC is upright and on the bottom. The acoustic release will be activated and returned to the surface.

BEACH REFURBISHMENT

Upon completion of all work, the construction team will remove all temporary construction and cable handling materials and other debris. The construction area shall be restored to a condition similar to that prior to the start of construction. The includes reconstruction of the sand berm and beach area.

SECTION 9. AS BUILT SURVEY

This survey will consist of an underwater documentation survey to determeine the as installed condition of each cable. The survey will be based upon the "Oceanographic Cable Inspection Proceedures" manual and is not reproduced for this document.

SECTION 10, CONTINGENCY PLANS

CABLE BREAK

The cable payout and operational sea states are calculated based upon a cable breaking strengths as shown in Appendix C. Should a cable break, NUSC Newport is tasked with the responsibility of providing a cable splice team. The splice team is required to be available on station within a 24 hour period.

In the event of a cable break aboard SEACON, the navigation team will note position, ships heading and depth information at the time of the break. A pinger will be dropped at the cable break location. SEACON will come to a dead stop and head to wind. The POIC and CHESDIV representitive will conduct a through safety check of personnel and take actions necessary to obtain medical assistance if required.

The CHESDIV and NUSC representative will conduct a thorough investigation of the cause of the cable break.

The general procedure for cable recovery will be to under run the cable from the shore towards sea, then splice the recovered section on to the cable which is aboard SEACON.

CABLE RECOVERY

SEACON will proceed to the West Cove area and move into position, stern to the shore, over the cable to be recovered and in a water depth of approximately 40 FSW. The UCT-2 deck force will lead the clump recovery line from the powered reel stand, and through the Pengo winch to the center sheave on the A frame. A 42 inch diameter cable sheave will be attached to the clump recovery line then lowered to the water level. UCT-2 divers working from a small boat, away from SEACON propulsion, will locate the cable and attach a buoy and line. SEACON will then lower the cable sheave to the bottom at the buoy position then move to seaward 200 feet. Divers will place the cable into the cable sheave.

SEACON will lift the cable off the bottom and under run the cable to seaward to a predetermined position. The positioning of the SEACON during recovery operations will be calculated based upon the known position of the cable break. Calculations will be made aboard SEACON.

The cable sheave will be maintained 100 feet off the bottom by adjusting the line payout of the Pengo winch. The depth of the sheave will be indicated by a transponder (supplied by NUSC) attached to the sheave.

With SEACON holding position, the cable sheave will be lifted to the surface. A cable stopper will be affixed to the shore cable end and connected to a line from the deck winch. A second cable stopper will be attached to the sea end of the cable a then to the gantry crane hook. The crane hook and cable stoppers will be used to pull a 75 ft. loop of cable onto the deck.

The loop of cable will be routed through the Cable Engine. The Cable Engine will then be used to recover the sea end of the cable. SEACON will be positioned to allow the cable to hang vertical during the recovery operation.

At the end of the cable recovery a cable stopper will be fixed at the water level. The stopper will be attached to the deck winch line. The recovered cable will then be removed from the Cable Engine, spliced to the cable end aboard SEACON, a returned to the Cable Engine for continued cable laying operations.

NUSC will be responsible for the quality control of cable splicing operations.

SECTION 11, NAVIGATION

EQUIPMENT

The navigation system will consist primarily of the Motorola Mini-Ranger system on board SEACON and the NUSC furnished BDAS system as a backup. Using either system, the position of the ship will be determined by obtaining ranges from two transponder reference stations located at known, fixed points ashore. The necessary system redundancy will be achieved by using two transponders for each system per site, plus ample spares. Separate power supplies will be maintained on board SEACON and ashore. On board SEACON, ranges will be determined by two separate range consoles and microprocessors. Only peripheral equipment will be shared. Both systems are accurate to $\pm$ 3 meters to a line of sight range of 40 NM.

SEACON'S Motorola MRS III (Mini-Ranger) system consists of a shipboard receiver-transmitter assembly with space diversity antennas, a range console and two or more shore-based transponders with individual antennas. The Motorola Data Processor accepts operator input via a Texas Instruments TI-743 KRS Data Terminal or a Teletronix 4025 Data Terminal and computes x-y coordinates, distances along a user defined track line and offsets. Output is routed to a variety of peripherals including CRT helmsman displays, a magnetic tape recorder and a plotter. Additionally the processor output feeds into the cable monitoring system.

The Bathymetric Data Aquisitian System (BDAS) provided by NUSC operates similarly to SEACON'S system and utilizes a Del Norte-210 range-range system, a NUSC built Time of Day and General Interface Electronics Unit, a Hewlett Packard 9825A calculator with magnetic tape, a helmsman/pilots aid a Hewlett Packard digital plotter and Del Norte shore transponders. The BDAS also included an EDO-Western 261-C depth digitizer unit and an AN/AQS 14 sonar unit which may be used if needed.

CHESDIV and NUSC are responsible for the set-up, restart, shutdown and operation of their respective systems on board SEACON. All operation manuals and interconnection diagrams will be available in the SEACON control room.

The CHESDIV and NUSC navigation system operators will work from SEACON'S control room where they will have a clear view of operations. In this room the equipment will be dry and temperature controlled.

On land power for the transponders will be serviced by UCT-2 on a 24 hour basis. 30 ea-12V deep draw 215 amp-hr batteries will be placed in a rotation where six batteries will be operational and two batteries will be charging for each of 2 sites. In this way each battery will run approximately 48 hours and charge for twelve. See table 11.1 for a typical battery schedule. UCT-2 will establish the recharging station at or near Capitaine 3 to cut transit times. UCT-2 will construct sturdy stands of timber to hold four transponders strapped on vertically at heights between five and ten feet off the ground.

SHORE TRANSPONDER BATTERY SCHEDULE - TYPICAL

TIME (hrs)	HOURS IN USE RT1	RT2	RT3
0	0	0	0
12	12/0	12	12
24	12	24/0	24
36	24	12	36/0
48	36/0	24	12
60	12	36	24
ETC			

BATTERIES REQUIRED:
(2 BATT/RT) (3 RT/SITE+1 SET CHARGING) (2 SITES) = 16 BATTERIES

MAXIMUM USAGE =48 HOURS

NORMINAL CHARGE TIME = 12 HOURS

TABLE 11.1

LOCAL GRID

For the purposes of this installation, a local metric x-y coordinate grid has been established to improve navigation accuracy and to simplify distance calculations. The two transponder locations ashore are used to define the coordinate system. A true north-south axis runs through CAPITAINE #3 and an east-west axis passes through BLUFF #2. These two lines intersect in West Cove. To avoid negative coordinates, the grid origin was shifted 50,000 meters south and west. Thus, the coordinates of the shore transponder locations are as follows.

POINT	LATITUDE	LONGITUDE	LOCAL x(m)	LOCAL y(m
CAPITAINE #3	33° 01' 2.97	118° 35' 23.13"	50,000	60,223
BLUFF #2	32° 55' 35.87"	118° 31' 3.30"	56,523	50,000

The baseline distance between the transponder locations are as follows.

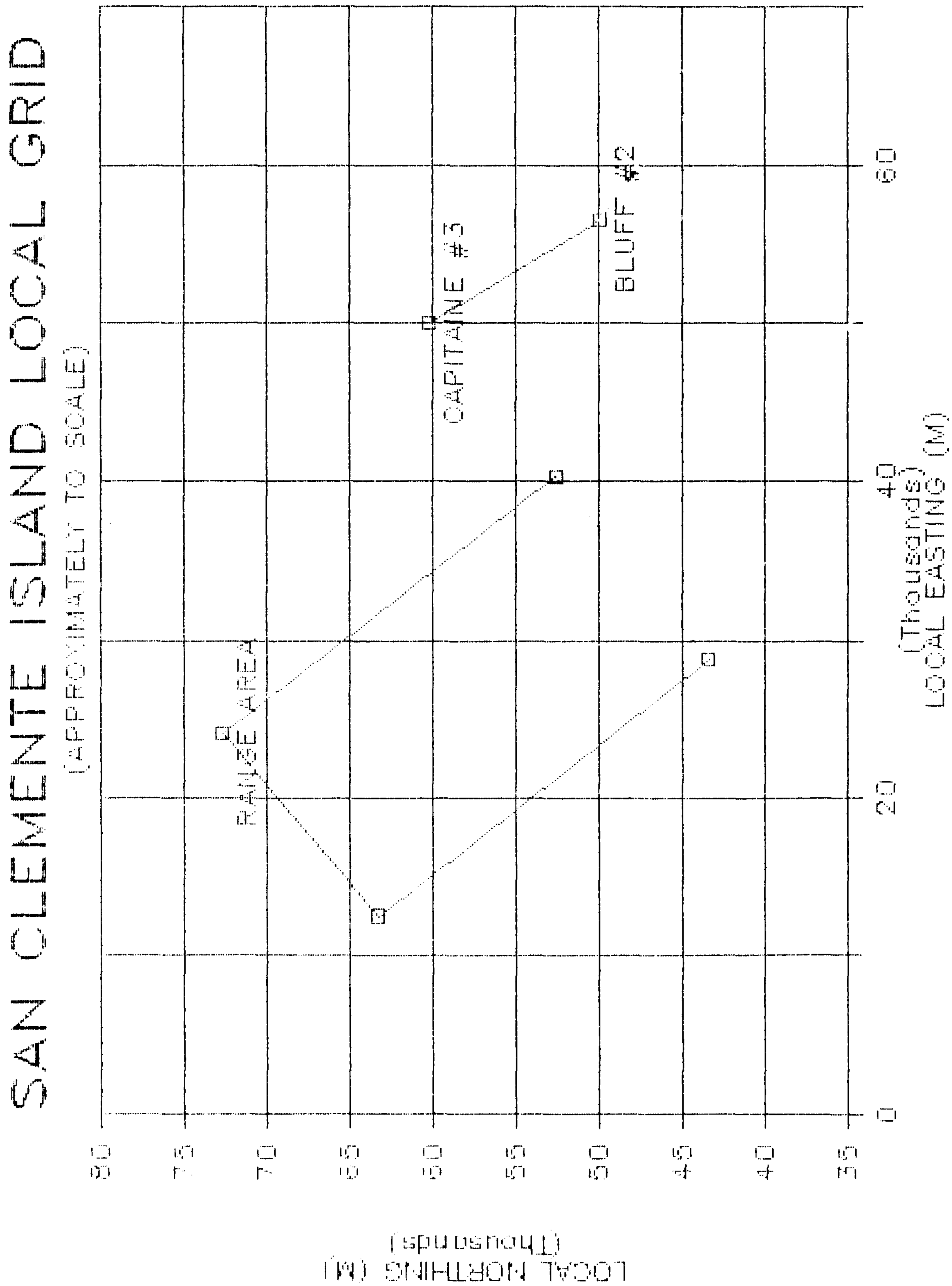
POINTS	x(m)	y(m)	DISTANCE(m)
CAPITAIN #3 to BLUFF #2	-6522.81	10222.86	12126.58

The local x-y grid is parallel to the California Lambert Plane Coordinate Projection. The following formulas are useful for converting between the two:

[cal. Lambert Easing (ft) x. 3048] - 341,006 = Local y (m)
[cal. Lambert Northing (ft) x. 3048] - 36,585 = Local y (m)

Figure 11.1 shows the relative position of the two transponder location to the SOCAL Range. See section 12 for cable laying and installation coordinates.

FIGURE 11.1



SAN CLEMENTE ISLAND LOCAL GRID
(APPROXIMATELY TO SCALE)
CAPITAINE #3
BLUFF #2
RANGE AREA
LOCAL EASTING (M)
(Thousands)
LOCAL NORTHING (M)
(Thousands)
0
20
40
60
80
75
70
65
60
55
50
45
40
35

SECTION 12, CABLE PAYOUT

This section contains the planned cable routes and the cable payout tables for installing a single SSL and a WQC respectively. Table 12.1 and 12.2 give the route coordinates; Figures 12.1 and 12.2 show plan views and Figures 12.3 and 12.4 show elevation. Cable payout data is given in tables 12.3 and 12.4.

[illegible] ROUTE [illegible] 84

POINT	LATITUDE D M S	LONGITUDE D M S	DEPTH (FT)	CALIFORNIA LAMBERT EAST (FT)	NORTH (FT)	LOCAL GRID X	Y	SEG LENGTH (FT)	SLANT LENGTH (FT)	FILL (%)	SLANT LENGTH + FILL (FT)	CUMULATIVE SEG LENGTH (FT)	CUMULATIVE SLANT LENGTH (FT)	CUMULATIVE SLANT LENGTH + FILL (FT)	(NM)
SHORE & BOTTOM CABLES															
1	33 [illegible] 0.29	118 35 44.33	0	1231617.00	317382.00	45448	60153	700	700	0	700	700	700	710	0.12
1	33 [illegible] 45.26	118 35 50.47	45	1230460.60	315975.50	45279	58724	1512	1512	10	1664	2212	2212	2364	0.39
2	33 [illegible] 24.13	118 36 3.95	100	1228808.74	317760.51	46784	59155	2730	2731	10	3005	4942	4944	5368	0.88
3	33 59 [illegible]	118 37 [illegible]	300	1224299.04	315077.22	47400	55495	9555	9556	10	10512	14497	14500	15880	2.61
3A	33 58 26.90	118 37 52.98	800	1219733.88	313142.10	46109	55817	5082	5090	10	5599	19578	19591	21479	3.53
3B	33 58 10.80	118 38 44.05	1500	1215314.13	311191.79	44662	55100	4951	5032	10	5535	24529	24623	27015	4.44
4A	33 57 40.65	118 41 4.02	3600	1203306.02	307335.41	41002	54195	12396	12572	10	13829	36925	37195	40844	6.72
4B	33 57 40.50	118 41 40.85	3900	1200205.40	308097.52	40957	54057	3151	3165	10	3482	40076	40360	44326	7.29
4C	33 55 7.87	118 44 25.41	4200	1205901.45	305993.91	35697	55158	14538	14541	10	15995	54614	54901	60321	9.92
[illegible]	33 55 20.00	118 46 [illegible]	4250	1227399.25	302447.37	[illegible]	55601	6133	6133	10	3947	60747	61035	69268	11.39
[illegible]	33 55 35.85	118 48 [illegible].25	4550	1219012.41	304208.70	31244	56147	10048	10048	10	11053	70795	71083	80321	13.21
12A	33 55 47.67	118 49 50.77	4450	1211076.57	305601.70	27705	56572	7601	7602	10	8362	80396	80685	88903	14.62
12B	33 55 51.99	118 51 4.07	4620	1207481.76	306159.20	27135	56770	2900	2905	10	3196	83496	83790	92099	15.15
JUMP-1	33 59 15.00	118 51 40.97	4650	1204402.19	308886.63	23195	57564	4099	4100	10	4509	87595	87890	96608	15.89
12C	33 59 40.50	118 51 12.20	2250	1201529.63	311227.44	23010	58277	3499	4237	2.18	4330	91095	92127	100938	16.60
A-FRAME	33 59 45.00	118 51 15.00	1650	1201048.74	311662.10	23164	58410	650	769	2.18	785	91745	92895	101723	16.73
JUMP-2	33 [illegible] 7.07	118 51 45.50	4650	1198779.82	313967.52	24352	59112	3450	4443	1.28	4500	95195	97339	106224	17.47
12D	33 [illegible] 6.07	118 52 12.95	4650	1196279.01	313967.03	23650	59112	2401	2401	10.8	2733	97595	99739	108957	17.92
JUMP-3	33 [illegible] 5.55	118 52 5.10	4650	1192279.55	313967.52	22401	59112	4099	4099	10.8	4667	101695	103839	113624	18.69

LENGTH SUMMARY	FEET	(NM)
SEA CABLE	99773	16.424
[illegible] CABLE	3000	0.506
[illegible] CABLE	4500	0.740
[illegible] CABLE	7400	1.217
LOWERING LINE	7400	1.217

TABLE 12.1

SSL ROUTE

FIGURE 12.1

SSL ROUTE

WQC ROUTE (6/28/84)
===================

POINT	LATITUDE D	M	S	LONGITUDE D	M	S	DEPTH (FT)	CALIFORNIA LAMBERT: EAST (FT)	NORTH (FT)	LOCAL GRID: X (M)	Y (M)	X/Y LENGTH (FT)	SLANT LENGTH (FT)	FILL %	SLANT LENGTH + FILL (FT)	CUMMULATIVE: X/Y LENGTH (FT)	SLANT LENGTH (FT)	SLANT LENGTH + FILL (FT)	(NM)
T								---	---	---	---	---	---	---	---	---	---	---	---
0	33	1	0.29	118	35	44.33	0	1281017.00	317382.00	49448	60153	700	700	0	700	700	700	700	0.12
1	33	0	46.26	118	35	50.47	45	1280462.60	315975.50	49279	59724	1512	1512	10	1664	2212	2212	2364	0.39
2	33	0	24.16	118	36	8.95	120	1278838.74	313780.50	48784	59055	2730	2731	10	3005	4942	4944	5368	0.88
3	32	59	0.00	118	37	0.00	300	1274299.34	305373.22	47400	56493	9555	9556	10	10512	14497	14500	15880	2.61
3C	32	58	32.59	118	38	30.12	600	1266561.19	302779.08	45042	55702	8161	8167	10	8984	22658	22667	24864	4.09
3D	32	58	20.32	118	39	10.43	1500	1263099.39	301618.54	43987	55348	3651	3760	10	4136	26309	26427	29000	4.77
9D	32	57	53.83	118	41	4.68	3900	1253306.20	299167.40	41002	54601	10095	10377	10	11414	36405	36804	40414	6.65
9E	32	58	27.87	118	44	30.55	4200	1235852.51	303020.77	35682	55776	17874	17877	10	19664	54279	54681	60079	9.88
9F	32	59	14.19	118	48	17.00	4500	1216681.00	308167.33	29838	57344	19850	19853	10	21838	74129	74533	81916	13.47
WH	32	59	34.18	118	49	54.95	4600	1208390.83	310392.81	27312	58023	8584	8584	10	9443	82713	83117	91359	15.03
WQC	32	59	45.00	118	50	48.00	4650	1203900.00	311598.37	25943	58390	4650	4650	10	5115	87362	87768	96474	15.87

LENGTH SUMMARY:	(FT)	(NM)
WQC CABLE	96474	15.87

TABLE 12.2

WQC ROUTE

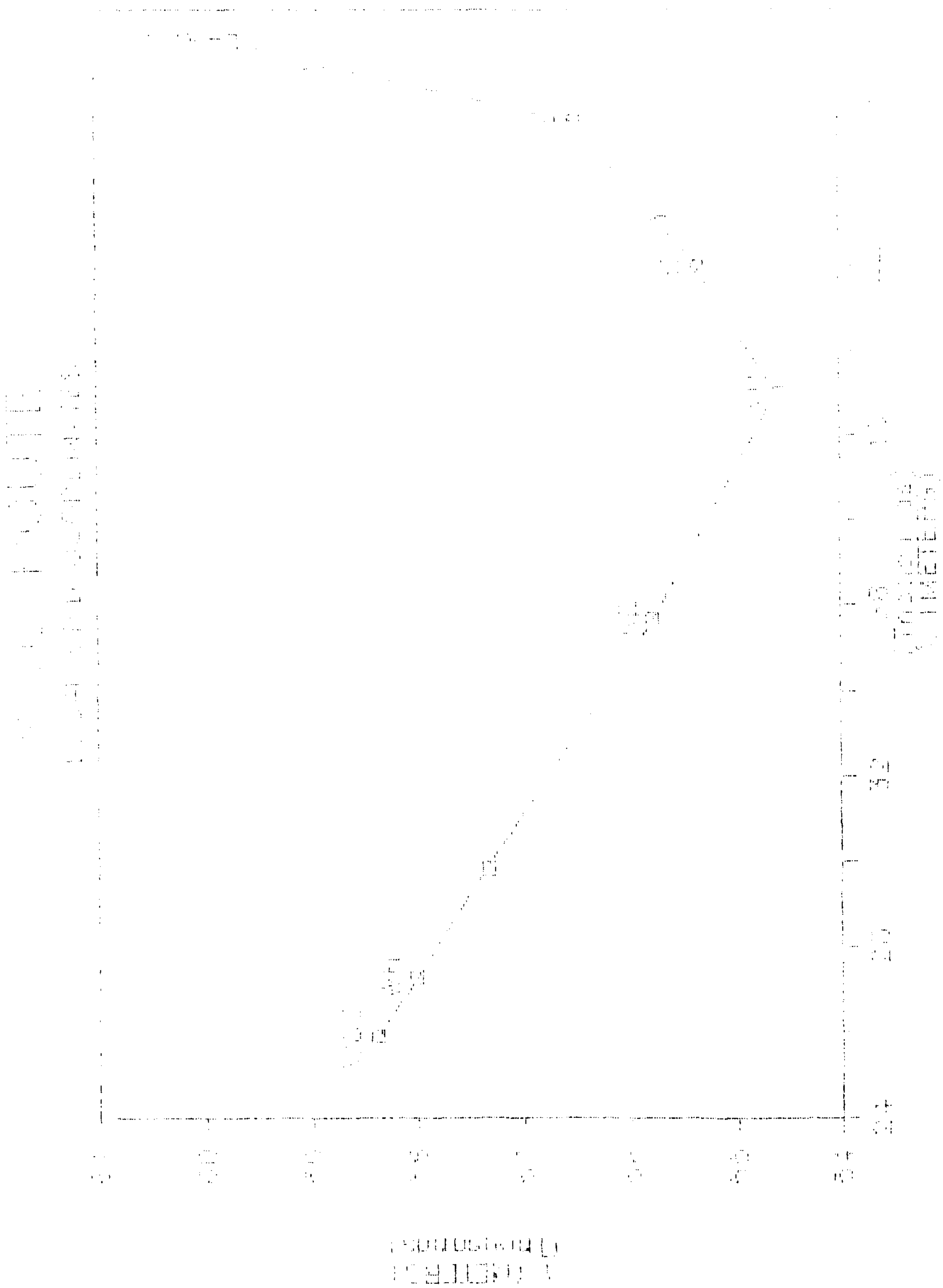


FIGURE 12.2
WQC ROUTE

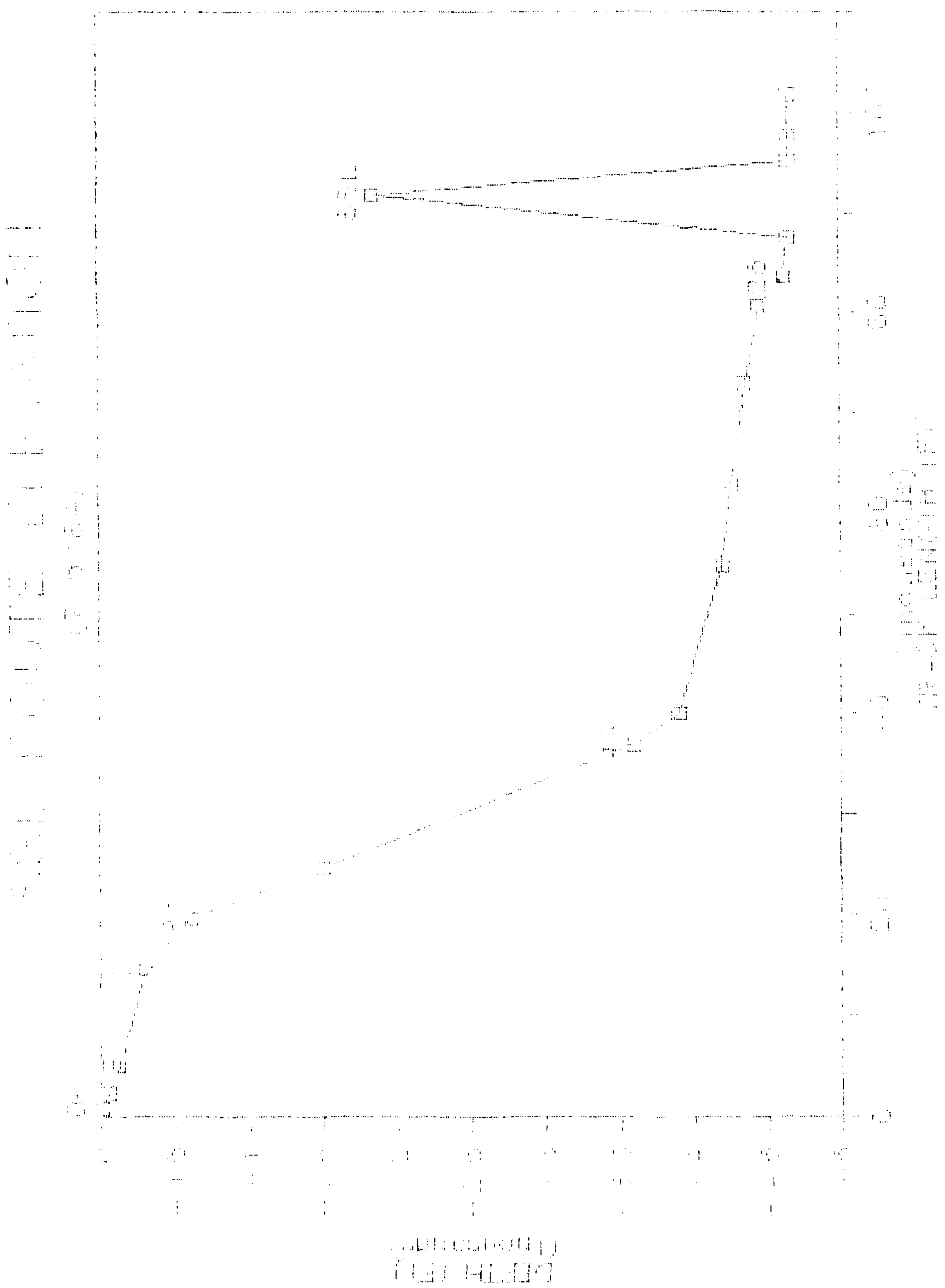


FIGURE 12.3
SSL ELEVATION

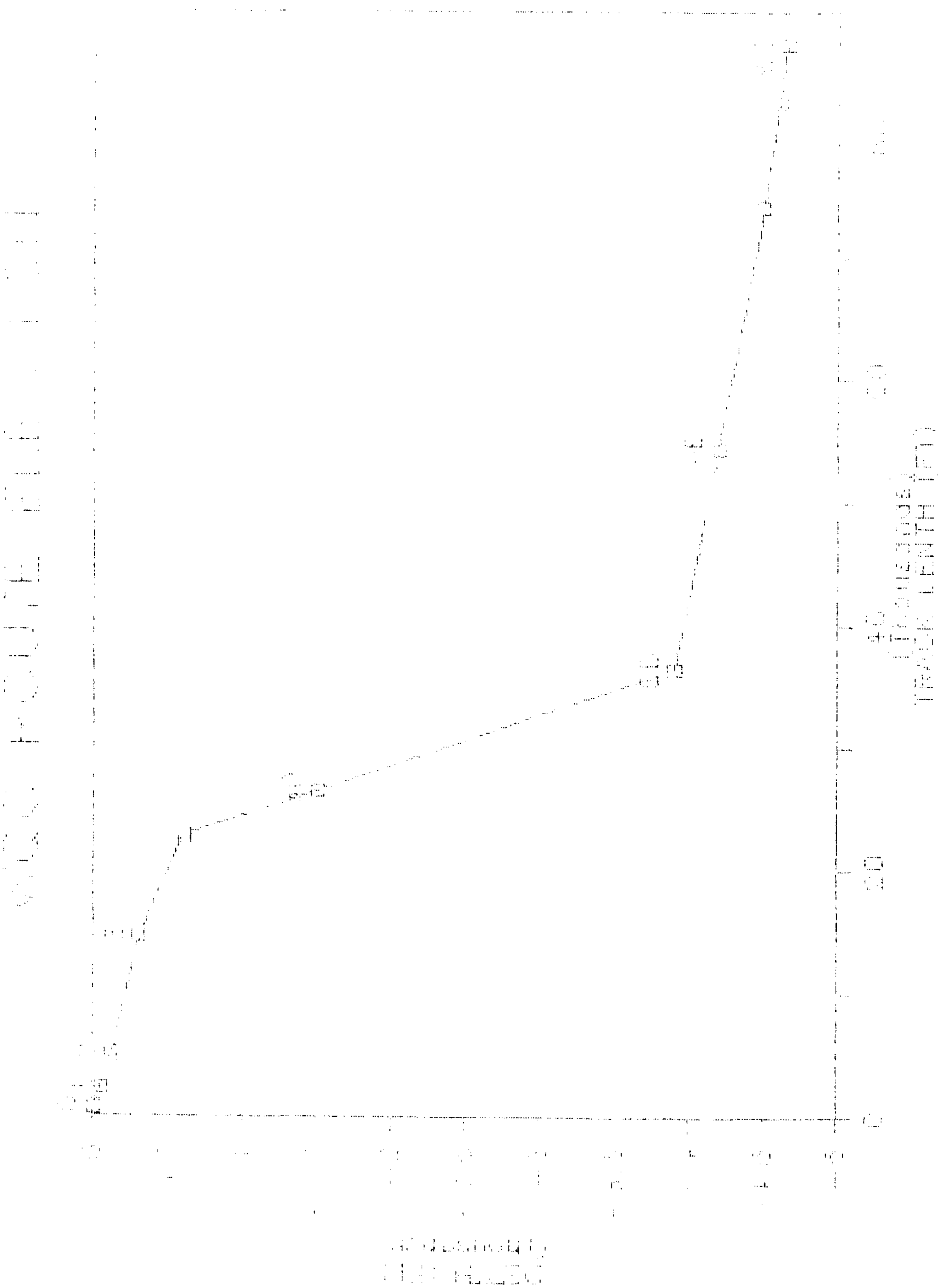


FIGURE 12.4
WQC ELEVATION

[illegible] CABLE PAYOUT RATES [illegible]
++++++++++++++++++++++++++++++++++++

SUB-SURFACE LINK [illegible] 0.5 KNOTS
====================================

INPUTS: BOTTOM POINT	DEPTH	DIST. DOWN TRACK	HYDRO CABLE CONST	FILL RATIO	SHIP SPEED	CALCULATIONS: CABLE ANGLE	BOTTOM ANGLE	DEL. SHIP POS.	INST. CABLE PAYOUT RATE	INCR TIME	INCR. CABLE PAYOUT	OUTPUT: TIME SUMM.	DIST. DOWN TRACK	CABLE OUT SUMM.	SHIP SPEED	BEGIN IDEAL PAYOUT RATE	BEGIN LINEAR PAYOUT RATE	BEGIN TRACK LINE
UNIT:	FT.	FT.	DEG-T		KT.	RAD.	RAD.	FT.	FT/MIN	MIN	FT.	MIN.	FT.	FT.	KT.	FT/MIN	FT/MIN	
SYMBOL:	Y	DXE	H	E	VS	A	B	XS	VC	T	DLC	ST	SXS	SL	VS	VC	VC	
[illegible]	45	2212	[illegible]	0	0	0.000	[illegible]	0	0	0	0	0	2212	2212		57.1	57	S1
[illegible]	[illegible]	4942	[illegible]	0.1	0.5	1.571	0.0274	0	57.1	54	3079	54	4942	5291	0.50	56.7	57	S2
[illegible]	[illegible]	14497	[illegible]	0.1	0.5	1.571	0.0188	0	56.7	139	10692	240	14497	15963	0.50	58.3	61	S3
[illegible]	600	19578	51	0.1	0.5	1.571	0.1589	0	58.8	100	5893	343	19578	21881	0.50	65.8	:	
[illegible]	1500	24529	51	0.1	0.5	1.571	0.1779	0	65.8	96	6427	440	24529	28308	0.50	65.0	65	S4
[illegible]	2600	36925	51	0.1	0.5	1.571	0.1675	0	65.0	245	15912	685	36925	44221	0.50	60.8	61	S5
[illegible]	[illegible]	40076	51	0.1	0.5	1.571	0.0949	0	60.8	62	3750	747	40076	48001	0.50	56.8	56	
[illegible]	4200	54614	51	0.1	0.5	1.571	0.0216	0	56.8	287	16295	1034	54614	64296	0.50	56.1	:	
[illegible]	4250	62747	51	0.1	0.5	1.571	0.0073	0	56.1	161	9007	1195	62747	73302	0.50	56.2	:	
[illegible]	4350	72795	51	0.1	0.5	1.571	0.0059	0	56.2	198	11143	1393	72795	84446	0.50	56.4	:	
[illegible]	4450	80596	51	0.1	0.5	1.571	0.0123	0	56.4	154	8682	1547	80596	93127	0.50	58.8	59	S6
[illegible]	4620	83496	51	0.1	0.5	1.571	[illegible]	0	58.8	SLOW	AND	DUMP	83496	96492	0.00	---	---	S7
[illegible]	4650	87596	---	---	---	---	0.0073	---	---	---	---	---	87596	---	0.00	---	---	
[illegible]	[illegible]	91695	---	---	---	---	0	---	---	---	---	---	91695	---	0.00	---	---	S8
[illegible]	[illegible]	91745	---	---	---	---	0	---	---	---	---	---	91745	---	---	---	---	
[illegible]	[illegible]	95195	---	---	---	---	0	---	---	---	---	---	95195	---	---	---	---	S9
[illegible]	[illegible]	97595	---	---	---	---	0	---	---	---	---	---	97595	---	---	---	---	S10
[illegible]	[illegible]	101695	---	---	---	---	0	---	---	---	---	---	101695	---	---	---	---	

TABLE 12.5

SSL PAYOUT RATES (TYP.)

WQC PAYOUT RATES 7 5.84

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WQC 0.5 KNOTS

========================

INPUTS: BOTTOM POINT	DEPTH	DIST. DOWN TRACK	HYDRO CABLE CONST	FILL RATIO	SHIP SPEED	CALCULATIONS: CABLE ANGLE	BOTTOM ANGLE	DEL. SHIP POS.	INST. CABLE PAYOUT RATE	INCR TIME	INCR. CABLE PAYOUT	OUTPUT: TIME SUMM.	DIST. DOWN TRACK	CABLE OUT SUMM.	SHIP SPEED	BEGIN IDEAL PAYOUT RATE	BEGIN LINEAR PAYOUT RATE	BEGIN TRACK LINE
UNIT:	FT.	FT.	DEG-FT		KT.	RAD.	RAD.	FT.	FT/MIN	MIN	FT.	MIN.	FT.	FT.	KT.	FT/MIN	FT/MIN	
SYMBOL:	Y	DXB	H	E	VS	A	B	XS	VC	T	DLC	ST	SXB	SL	VS	VC	VD	
1	45	2212	100	0	0	0.000	0.0203	0	0	0	0	0	2212	2212	0	57.1	57	W1
2	100	4942	100	0.1	0.5	1.571	0.0274	0	57.1	54	3079	54	4942	5291	0.50	56.7	57	W2
3	300	14497	75	0.1	0.5	1.571	0.0188	0	56.7	189	10692	242	14497	15983	0.50	57.6	58	W3
3C	600	22658	75	0.1	0.5	1.571	0.0367	0	57.6	161	9283	404	22658	25266	0.50	69.7	70	
3D	1500	26309	75	0.1	0.5	1.571	0.2416	0	69.7	72	5025	476	26309	30291	0.50	59.2	59	W4
5C	3900	36405	75	0.1	0.5	1.571	0.2333	0	59.2	199	13787	675	36405	44078	0.50	56.6	57	W5
5E	4200	54279	75	0.1	0.5	1.571	0.0167	0	56.6	353	19964	1028	54279	64142	0.50	56.5	56	W6
5F	4500	74129	75	0.1	0.5	1.571	0.0151	0	56.5	392	22137	1419	74129	86179	0.50	56.3	1	
5H	4600	82713	75	0.1	0.5	1.571	0.0116	0	56.3	SLOW	AND	DUMP	82713	95722	0.00	---	---	W7
WQC	4650	87362	---	---	---	---	0.0107	---	---	---	---	---	87362	---	0.00	---	---	

WQC 0.75 KNOTS

========================

INPUTS: BOTTOM POINT	DEPTH	DIST. DOWN TRACK	HYDRO CABLE CONST	FILL RATIO	SHIP SPEED	CALCULATIONS: CABLE ANGLE	BOTTOM ANGLE	DEL. SHIP POS.	INST. CABLE PAYOUT RATE	INCR TIME	INCR. CABLE PAYOUT	OUTPUT: TIME SUMM.	DIST. DOWN TRACK	CABLE OUT SUMM.	SHIP SPEED	BEGIN IDEAL PAYOUT RATE	BEGIN LINEAR PAYOUT RATE	BEGIN TRACK LINE
UNIT:	FT.	FT.	DEG-FT		KT.	RAD.	RAD.	FT.	FT/MIN	MIN	FT.	MIN.	FT.	FT.	KT.	FT/MIN	FT/MIN	
SYMBOL:	Y	DXB	H	E	VS	A	B	XS	VC	T	DLC	ST	SXB	SL	VS	VC	VD	
1	45	2212	100	0	0	0.000	0.0203	0	0	0	0	0	2212	2212	0	55.7	56	W1
2	100	4942	100	0.1	0.75	1.571	0.0274	0	55.7	36	3079	36	4942	5291	0.75	55.0	55	W2
3	300	14497	75	0.1	0.75	1.571	0.0188	0	55.0	126	10692	162	14497	15983	0.75	56.4	56	W3
3C	600	22658	75	0.1	0.75	1.571	0.0367	0	56.4	107	9283	269	22658	25266	0.75	104.6	105	
3D	1500	26309	75	0.1	0.75	1.571	0.2416	0	104.6	48	5025	317	26309	30291	0.75	100.3	104	W4
5C	3900	36415	75	0.1	0.75	1.571	0.2333	0	100.3	133	13787	450	36405	44078	0.75	54.9	55	W5
5E	4200	54279	75	0.1	0.75	1.571	0.0167	0	54.9	235	19964	685	54279	64042	0.75	54.8	55	W6
5F	4500	74129	75	0.1	0.75	1.571	0.0151	0	54.8	261	22137	946	74129	86179	0.75	54.5	1	
5H	4600	82713	75	0.1	0.75	1.571	0.0116	0	54.5	SLOW	AND	DUMP	82713	95722	0.00	---	---	W7
WQC	4650	87362	---	---	---	---	0.0107	---	---	---	---	---	87362	---	0.00	---	---	

TABLE 12.6

WQC PAYOUT RATES (TYP.)

APPENDIX A, PROJECT MATERIALS

The following list documents the major components which will be provided to the project.

CHESDIV

- OCP SEACON
- Cable handling equipment
- Jet pump
- Cable sheaves
- Color underwater TV system
- Dey winches (2), 20K tension capacity
- Load cells
- Deck radios
- Electronic distance measurement (EDM) equipment
- Float balloons
- Air lift system
- Acoustic release
- 3 NM of training cable
- Synthetic line, 6" cir., 6000 L.F., 90 K B.S.
- Modular mooring system

UCT-2

- Cable stoppers, Kevlar
  - 2 each 15K capacity
  - 4 each 40K capacity
- Swivel, stainless steel
- Cable warning tape
- Slings, (4) 1 in. wire. 25ft.
- Polypro line, 3 reels of 600 ft. each
- Batteries, 30 each, 12 VDC/218 amp. hour
- Battery charger (2)
- Battery tester
- Stands for navigation stations
- Cable stoppers (PLP)
- Training cable components
- Ordnance for trenching operations
- LCU dive platform

NUSC, Newport

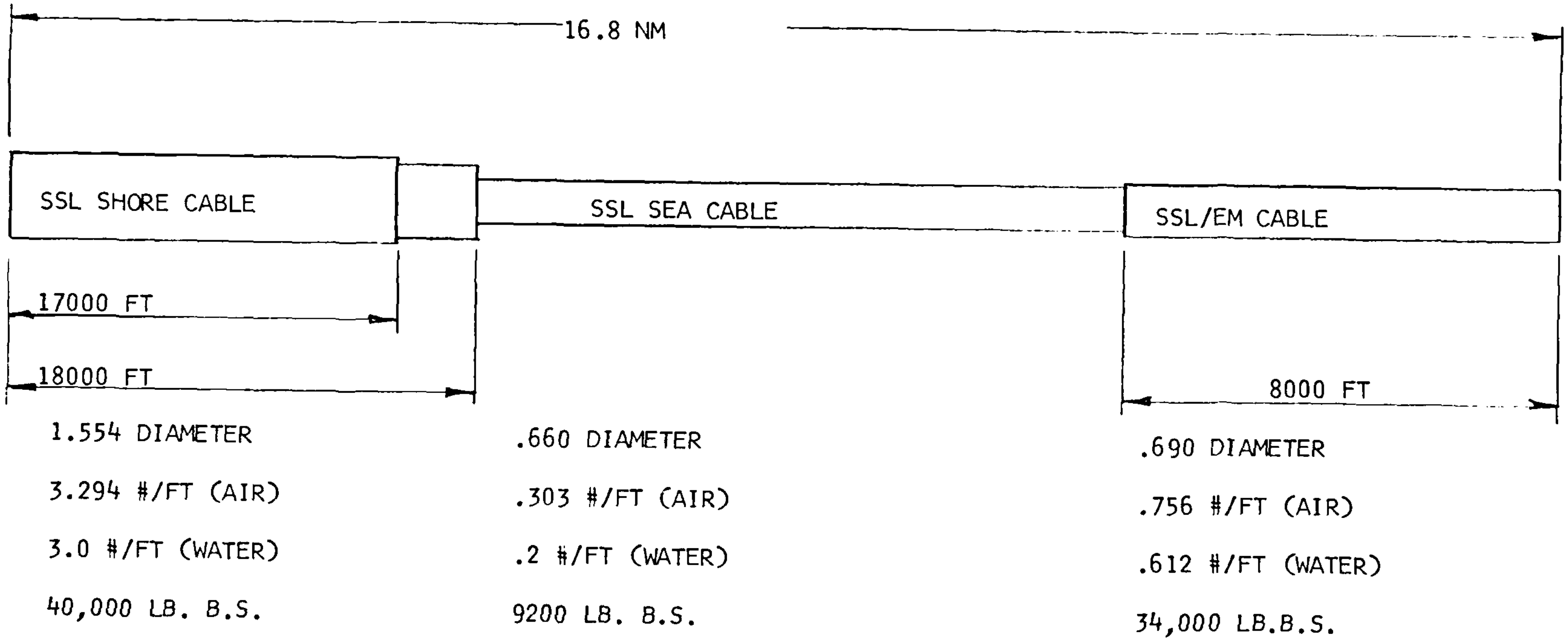
- Navigation system
- Transponders (4)
- Cable and electronics test equipment
- Cable splice contractor

APPENDIX B. Points of Contact

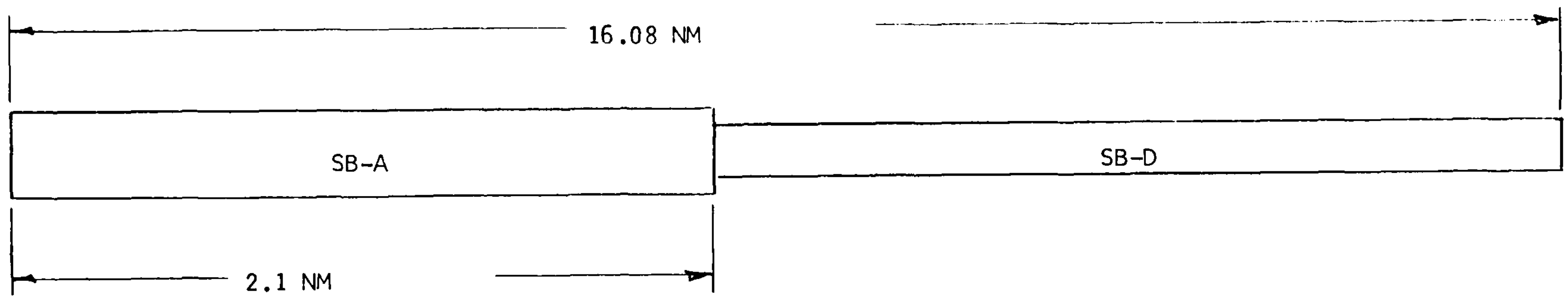
Chesapeake Div., Naval Facilities Engineering Command		A/V 288-6608 202-433-6608
	CDR Stevenson Ed Spencer Robert Cox Richard Asher Keith Cooper Lawrence Mendlow Ted Jones	
Underwater Construction Team Two		A/v 360-5911 805-982-5948
	LCDR T. Pyles CPOIC R. Willis APOIC D. Knopick	
Naval Underwater Systems Center, Newport, R.I.		A/V 933-XXXX 401-841-XXXX
	Bill Conklin, Proj. Mgr.	4802
	Tom Casey, Proj. Engr.	
	Bob Ricci, Br. Head	3814
	Mark Moore, Proj. Engr.	3093
	Frank Wyatt. O.E.	3093
	Bob Dupree,	
Naval Ocean Systems Center, San Diego		A/V 933-7479 619-225-7470
	John McKune	
COMASWWINGPAC, NAS North Island		A/V 951-6814 619-437-6814
	LCDR. Yesensky Dick Tuck	
PWC, San Diego, Rigging Shop		A/V 958-2804 619-235-2652
	George Parmelee	
Ship Berthing Services, S.D.		619-235-1431
Santa Fe Rail Road, S.D.		619-699-4075

APPENDIX C

CABLE DATA REFENCE MATERIAL



SSL CABLE DATA



1.83 DIAMETER	1.25 DIAMETER
4.1 #/FT (AIR)	1.3 #/FT (AIR)
2.8 3/FT (WATER)	.62 #/FT (WATER)
42,400 LB. B.S.	25,300 LB. B.S.
3.0 FT. MIN BEND RADIUS	3.0 FT. MIN BEND RADIUS

WQC CABLE DATA

END

DTIC

7-86